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ARMY MEDICAL DEPARTMENT

REPORT

FOR THE YEAR 1897.

WITH APPENDIX.

VOLUME XXXIX.

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1897

TO THE RIGHT HONOURABLE

THE SECRETARY OF STATE FOR WAR.

My Lord,

I have the honour to submit the accompanying Report on the Health and Sanitary Condition of the Army for the year 1897.

I have the honour to be,
My Lord,
Your Lordship's most obedient Servant,
J. JAMESON,
Director-General.

Medical Division, War Office,
23rd December, 1898.

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NOMENCLATURE AND CLASSIFICATION OF DISEASES.

INSTRUCTIONS FOR THE GUIDANCE OF MEDICAL OFFICERS REGARDING THE REVISED NOMENCLATURE OF DISEASES (1896 EDITION).

A revised edition of the Nomenclature of Diseases having been published by the Royal College of Physicians and adopted by the Registrar-General, it has become necessary to follow, in the Army Medical Service, the nomenclature used in civil life, in order to ensure, for statistical purposes, conformity of practice in the classification of diseases, and afford one and the same basis of comparison for both. All the statistical returns at present in use have been revised, and it becomes necessary to indicate the principal changes that have taken place, and the manner in which departmental sick returns are affected in consequence.

General diseases are no longer divided into groups, as in the last edition, and now include certain affections which were formerly returned among local diseases, notably tetanus, Hodgkins' disease (previously returned as lymphadenoma), and diabetes insipidus. Among the new terms introduced, the principal ones affecting military statistics are rubella and Mediterranean fever.

Certain parasitic affections, such as scabies, phthiriasis, ringworm, &c., formerly returned as parasitic diseases of the skin, will, in future, be included with other parasitic invasions.

The affections known as scrofulous should now be returned under the heading of tubercle, and for military purposes it is desirable that cases of tubercular disease of the lung should be enumerated separately.

Among local diseases, the term "palpitation and irregularity of the action of the heart" is replaced by "disordered action of the heart." Phthisis is now shown only as acute and chronic, the term pneumonic phthisis being expunged.

The introduction of the term "soft chancre" is important; in future, only cases of non-venereal origin will be recorded as "ulcer of penis."

Among diseases of the organs of locomotion, the term "myalgia" has been adopted.

It will not be necessary to return cases of fracture, contusion, wound, sprain, &c., separately, according to the anatomical system affected, the only definitions necessary in the sick returns being, fracture of skull, fracture of spine, and of other bones; wounds, gunshot, and other wounds.

In cases where they are not actually forbidden in the revised edition, synonyms, which are in common use, and which are best adapted for military statistical returns, have been retained, *e.g.*, ague, meningitis, dyspepsia, peritonitis, laryngitis.

In order to facilitate the work of registration and to ensure the accuracy of the terms employed, the nomenclature numbers of the various diseases will always be given in the returns of sick.

J. JAMESON,
Director-General.

Army Medical Department,
War Office,
October, 1896.

The changes in the 1896 edition of the nomenclature of diseases, explained in the above instructions, rendered it necessary to make some minor alterations in the arrangement of the tables contained in the abstracts which form part of the Army Medical Department Report, and to revise the statistics of the previous ten years which form the basis of the average rates employed for purposes of comparison.

The following alterations have accordingly been made :—

1. Influenza and diphtheria have been allotted separate headings.
2. Cases of "scrofula" have been added to "tubercular diseases."
3. Cases of "tetanus" have been deducted from "diseases of the nervous system" and added to the heading "other general diseases."
4. Cases of "diabetes insipidus" have been deducted from "diseases of the urinary system" and added to the heading "other general diseases."
5. Diseases of a parasitic nature have been deducted from "diseases of the skin" and added to the heading "parasitic diseases."

Although there are other variations in the new edition of the nomenclature, their influence on the average ratios for the 10 year period are unappreciable, and have consequently been ignored.

In connection with venereal diseases it should, however, be noted that "ulcer of penis" is no longer a venereal disease, although up to 1896, all cases were so recorded, and included under "primary venereal sores." For comparative purposes, therefore, a foot note is added wherever required, showing the ratios which would have resulted, were these cases included in the total for all venereal diseases.

ARMY MEDICAL DEPARTMENT
REPORT FOR 1897.

ARMY MEDICAL DEPARTMENT REPORT FOR 1897.

I.—HEALTH OF THE TROOPS AT HOME AND ABROAD.

Troops at Home and Abroad.

The average strength of European troops serving at home and abroad in 1897, as computed from the returns received by the Army Medical Department, was 198,294 warrant officers, non-commissioned officers and men. The total number of admissions to hospital was 192,654, and the total deaths 1,871. The admissions represent a ratio of 971·5 per 1,000 of strength as above; the deaths one of 9·35 per 1,000, on a strength of 200,058, which includes detached men not shown in the returns received.

There has been again a decline in the admission and mortality rates amongst troops serving in the United Kingdom during the year, both as compared with the previous year and with the average for the decennial period. With the exception of an extensive but mild outbreak of scarlet fever at Caterham, eruptive fevers have shown no special prevalence. The ratios of admissions and mortality for enteric fever are exactly the same as in 1896, and slightly below the average rates. About one-fifth of the admissions occurred in Dublin, a proportion that is somewhat less than usual at that station. Many of these admissions as well as several others elsewhere were, however, traced to defects in the barracks at Birr. Influenza was more prevalent than in 1896, but did not appear in an epidemic form. The decline in venereal diseases, which commenced in 1886 and which has continued practically without interruption ever since, is again observed in 1897, the greatest decrease being in primary venereal sores. A very marked variation has been noted, however, in the prevalence of venereal disease at individual stations. Nothing special has been noted with the regard to the prevalence of other diseases in the United Kingdom.

At Gibraltar the health of the troops was worse than in 1896, mainly in consequence of a marked increase in the admissions for primary venereal sores. Enteric fever was also more prevalent than in 1896, but continues to remain much below the average for this command.

The statistics of the Malta Command have been complicated by the inclusion of the statistics of the sickness amongst troops in Crete. Mediterranean and other continued fevers again show increase. Many of these cases occurred in Crete, which also accounted for a large number of admissions for dysentery. Venereal diseases show no increase, and a comparatively low admission rate continues to prevail.

In Canada, as usual, the health of the troops was very good, and no special prevalence of disease occurred.

Troops a
Home an
Abroad.

In Bermuda, enteric fever, the prevalence of which has almost invariably compared unfavourably with other commands, was slightly more prevalent than in 1896, but considerably below the decennial average. Venereal diseases, as usual, continue much lower than in other commands.

In Jamaica, the chief event was an outbreak of yellow fever, which fortunately did not assume large proportions, causing only 16 admissions and 10 deaths amongst the European warrant and non-commissioned officers and men.

In the West Indies generally, the health of the troops was not so good as in the previous year, owing to the prevalence of continued and malarial fevers. Venereal diseases were not quite so prevalent as in 1896, but still show a very high admission rate, a large increase in secondary syphilis, which was specially marked in 1896 and which has been more or less continuous since 1888, being again noticed.

The health of the troops in South Africa was, on the whole, fairly good, but enteric fever and dysentery caused much sickness in Natal. Although there was a considerable increase in secondary syphilis, venereal diseases generally continued to decline.

In Mauritius malarial fevers, which form the chief cause of sickness there, continued to decline, and the health of the troops generally was above the average.

In Ceylon there was little sickness of a special character, and venereal disease markedly declined.

In China the health of the troops generally was unfavourable, the most marked feature being the continuous and exceptional prevalence of venereal diseases, which show a further increase, amounting to nearly 33 per cent. in excess of the admissions during the previous year.

In the Straits Settlements there was a large amount of sickness from malarial fevers, but venereal diseases, althoough they continue to be very prevalent, declined considerably as compared with 1896 and with the decennial average.

In India there was an increase in the admission and constantly sick rates, largely due to malarial fevers, and there was also an increase in sickness from enteric, other continued fevers and cholera. There was a small decrease in venereal diseases, mainly in primary venereal sores. These diseases accounted for one-third and malarial fevers for nearly one-fourth of the total number of admissions. There were a few cases of plague amongst the troops in the Bombay Command.

The admission ratio of the troops in Egypt is lower than in 1896, and much below the average rate, the most notable decline being in enteric fever, venereal diseases and digestive disorders.

The statistics of some of the most important of the results of sickness, in every command in which the troops were stationed, are exhibited in the following Table :—

Troops at Home and Abroad.

1897.

European Troops.	Average Strength.	Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.
Troops at Home and Abroad	**198,294**	**192,654**	**1,871**	**3,003**	**3,619**	**12,198·63**
United Kingdom ..	96,526	61,841	336	—	1,953	3,662·96
Gibraltar..	4,726	3,888	20	123	60	263·75
Malta	9,175	8,080	97	258	88	487·51
Egypt and Cyprus ..	4,449	3,242	37	55	34	242·95
Canada	1,601	863	1	23	15	38·05
Bermuda	1,521	687	17	16	17	40·64
West Indies	1,350	1,761	20	42	28	117·45
West Africa	38	98	2	13	—	3·21
South Africa and St. Helena	7,205	6,298	50	75	66	411·97
Mauritius	756	881	7	38	4	60·60
Ceylon	1,324	1,443	8	14	8	75·76
China	1,417	2,973	11	73	29	162·07
Straits Settlements ..	1,352	1,357	9	15	16	89·81
India	64,531	96,824	1,242	2,258	1,301	6,541·90
On board Ship	2,823	2,418	14	—	—	—

1897.

European Troops.	Ratio per 1,000 of Strength.					Average sick-time to each Soldier.	Average duration of each Case of Sickness.
	Admitted.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.		
Troops at Home and Abroad ..	* **971·5**	† **9 35**	‡ **30·20**	§ **18·30**	‖ **62·25**	Days.‖ **22·72**	Days.‖ **23·40**
United Kingdon ..	640·6	3·42	—	19·87	37·95	13·85	21·62
Gibraltar	822·7	4·23	26·03	12·69	55·81	20·37	24·76
Malta	880·6	10·57	28·12	9·59	53·13	19·39	22·02
Egypt and Cyprus ..	728·7	8·31	12·36	7 64	54·61	19·93	27·35
Canada	539·0	·62	14·36	9·37	23·77	8·67	16·09
Bermuda	451·7	11·18	10·52	11·18	26·72	9·75	21·59
West Indies	1304·4	14·81	31·11	20·74	87·00	31·75	24·34
West Africa	2578·9	52·63	342·11	—	84·47	30·83	11·96
South Africa and St. Helena	874·1	6·94	10·41	9·16	57·18	20·87	23·88
Mauritius	1165·3	9·26	50·26	5·29	80·16	29·26	25·10
Ceylon	1069·9	6·04	10·57	6·04	57·22	20·89	19·16
China	2098·1	7·76	51·51	20·47	114·38	41 75	19·90
Straits Settlements ..	1003·7	6·66	11·09	11·83	66·43	24·25	24·16
India	1500·4	19·25	34·99	20·16	101·38	37·00	24·66
On board Ship.. ..	1040 8	6·02	—	—	—	—	—

---

* Calculated on strength excluding men detached (1,764).

† Calculated on strength including men detached.

‡ Calculated on strength excluding United Kingdom and troops on board ship.

§ Calculated on strength including men detached, and excluding troops on board ship.

‖ Calculations exclude men detached and troops on board ship.

Troops at Home and Abroad.

1887 to 1896.

European Troops.	Aggregate strength for 10 years.	Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.
Troops at Home and Abroad ..	**1,992,577**	**1,987,356**	**17,749**	**22,821**	**28,873**	**115,223·63**
United Kingdom ..	1,002,410	737,667	4,792	—	16,657	42,614·20
Gibraltar	47,155	33,424	189	723	389	2,199·25
Malta	72,617	48,449	547	1,395	765	3,218·53
Egypt and Cyprus ..	45,220	45,164	501	861	547	2,960·92
Canada	13,945	6,960	61	200	166	356·14
Bermuda	13,993	7,825	141	177	114	413·89
West Indies ..	11,865	13,281	100	240	159	765·11
West Africa ..	—	—	—	—	—	—
South Africa and St. Helena	34,248	29,738	227	821	498	1,912·90
Mauritius	5,452	7,439	82	305	95	402·14
Ceylon	12,429	12,777	138	253	142	724·45
China	13,797	18,277	156	460	197	896·37
Straits Settlements ..	12,186	13,065	82	221	113	883·31
India	681,968	984,672	10,571	17,165	9,031	57,876·42
On board Ship ..	25,262	28,618	162	—	—	—

1887 to 1896.

European Troops.	Ratio per 1,000 of Strength.					Average sick-time to each Soldier.	Average duration of each Case of Sickness.
	Admitted.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.	Days.	Days.
Troops at Home and Abroad ..	**997·4**	**8·81**	**23·65**	**14·52**	**58·57**	**21·38**	**21·47**
United Kingdom ..	785·9	4·68	—	16·27	42·51	15·52	21·04
Gibraltar	708·8	4·01	15·33	8·25	46·65	17·02	24·01
Malta	666·9	7·53	19·20	10·53	44·29	16·17	24·25
Egypt and Cyprus ..	998 8	11·08	19·04	12·09	65·48	23·90	23·93
Canada	499·1	4·37	14·34	11·90	25·54	9·32	18·68
Bermuda	559·2	10·07	12·65	8·14	29·58	10·80	19·31
West Indies	1119·3	8·43	20·23	13·40	64·48	23·54	21·08
West Africa*	2652·7	45·02	237·94	12·86	84·89	30·98	11·68
South Africa and St. Helena	868·3	6·63	23·97	14·54	55·85	20·39	23·48
Mauritius	1364·4	15·04	55·94	17·42	73·76	26·92	19·73
Ceylon..	1028·0	11·10	20·35	11·42	58·29	21·27	20·69
China	1324·7	11·31	33·34	14·28	64·97	23·71	17·91
Straits Settlements ..	1072·1	6·73	18·14	9·27	72·48	26·46	24·68
India	1443·9	15·50	25·17	18·24	84·87	30·98	21·45
On Board Ship ..	1132·8	6·41	—	—	—	—	—

* For eight years only—1889 to 1896.

II.—ON THE HEALTH OF THE TROOPS SERVING IN THE UNITED KINGDOM.

SICKNESS AND MORTALITY.

United Kingdom.

The average strength of warrant officers, non-commissioned officers and men who served in the United Kingdom during the year 1897 was 96,526, according to the returns furnished by medical officers. In addition to this there were certain men detached from their corps, the average number of whom is computed to have been 1,764.

The following table gives the general statistics of sickness and mortality among the troops quartered in the three divisions of the kingdom, England and Wales, Scotland, and Ireland, and also in the United Kingdom as a whole :—

1897.	Average Strength.	Admissions.	Deaths.	Invalids.	Constantly Sick.
England and Wales	71,374	46,151	254	1,360	2789 ·31
Scotland	3,782	1,916	11	46	93 ·08
Ireland	21,370	13,774	71	547	780 ·57
United Kingdom.. ..	96,526	61,841	336	1,953	3662 ·96

(*continued.*)

1897.	Ratios per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
	Admissions.	Deaths.*	Invaliding.*	Constantly Sick.		
England and Wales ..	646 ·6	3 ·52	18 ·94	39 ·08	14 ·26	22 ·06
Scotland	506 ·6	2 ·91	12 ·16	24 ·61	8 ·98	17 ·73
Ireland	644 ·5	3 ·11	23 ·95	36 ·52	13 ·33	20 ·68
United Kingdom..	640 ·6	3 ·42	19 ·87	37 ·95	13 ·85	21 ·62

* These ratios are calculated on a strength including men detached.

Comparing the above with the corresponding table in the previous year it is observed that in England and Wales the admission rate shows a decrease of 5·1 per 1,000, the death rate a decrease of ·07, and the constantly sick rate one of ·64 per 1,000. The average sick time to each soldier was shorter by ·28 of a day; and the average duration of each case of sickness was also shorter by ·25 of a day. Compared with average ratios for the preceding ten years

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there was a decrease of 114·3 per 1,000 in the admission rate, of 1·19 in the mortality rate, and of 5·54 per 1,000 in the ratio of constantly sick. The average sick time to each soldier and the average duration of each case of sickness showed decrease in the former but increase in the latter of 2·03 and ·65 respectively.

In Scotland the admission and mortality rates were below those of the preceding year by 47·5 and 1·34 respectively, but the ratio of constantly sick showed an increase of ·64 per 1,000. The average sick time to each soldier and the average duration of each case of sickness exceeded the corresponding averages in the previous year by ·21 of a day and 1·90 days respectively. In comparison with the corresponding average ratios for the preceding ten years, the ratio of admission shows a decline of 126·6, that of mortality 2·45, and that of constantly sick 3·63 per 1,000. The average sick time to each soldier was less by 1·33 days, but in the average duration of each case of sickness there is an increase of 1·45 days.

In Ireland the admission rate was 6·0 per 1,000 in excess of the previous year, but the ratios of mortality and constantly sick were less, the former by ·34 and the latter by ·46 per 1,000. The average sick time to each soldier and the average duration of each case of sickness were also less by ·20 and ·52 of a day respectively. In comparison with the average ratios of the preceding ten years, a decline is shown, amounting to 34·2 in the admission rate, to 1·39 in that of mortality, and to 1·96 per 1,000 in that of constantly sick. The average sick time to each soldier was shorter by ·71 of a day, while the average duration of each case of sickness was practically the same, the difference being only ·01 of a day.

In comparison with the previous year the United Kingdom as a whole shows a decrease of 4·5 in the admission rate, of ·16 in the rate of mortality, and of ·57 in that of constantly sick. The average sick time to each soldier is less by ·25 of a day, and the average duration of each case by ·23 of a day. In comparison with similar average ratios for the preceding ten years there is a decline of 95·3 in the rate of admission, of 1·26 in that of mortality, and of 4·56 in the constantly sick rate. The average sick time to each soldier is less by 1·67 days, but the average duration of each case of sickness shows an increase of ·58 of a day.

The total loss to the service by death and discharge by invaliding on account of medical unfitness, during the year, was 2,289 men, equal to a ratio of 23·29 per 1,000 of the strength, which is below the previous year's rate by 1·49.

The more important statistics of sickness, mortality, and invaliding, according to the different sections of disease are given for the whole of the troops in the United Kingdom in Abstract I, and for the troops quartered in the three divisions of the Kingdom in Abstracts A, B, and C.

GENERAL DISEASES.—For *eruptive fevers* there were 1,057 admissions and 10 deaths, giving ratios per 1,000 of 11·0 and ·10 as compared with 9·1 and ·07 in the previous year, and 8·7 and ·06 for the preceding ten years.

No admission for *small-pox* occurred during the year. One case was returned in 1896, while 5 represents the average number of admissions for the previous 10 years. *Scarlet fever* caused 574 admissions and 10 deaths, equal to ratios of 5·9 and ·10 per 1,000, as compared with 3·7 and ·07 in the previous year, and 3·4 and ·05, the average for the preceding ten years.

Of the total, 537 cases occurred in England and Wales, 5 in Scotland, and 32 in Ireland. No district was exempt, but the Home district gave 325 cases or more than all the remaining districts combined. The Aldershot, Southern, Woolwich, and Dublin districts followed next in order with 87, 40, 27, and 20 respectively. The greatest number of cases occurring at any one station was 292 at Caterham, or more than half the total number in the United Kingdom. The disease there was of a mild type and there was no death. The milk supply was at one time suspected, but a careful investigation produced no satisfactory evidence to show that this was the cause of the epidemic. All the facts pointed to the introduction of the disease into the barracks from unknown sources, and to its spread by infection from person to person. The mildness of the disease favoured this, many of the cases being detected only on medical inspection. The spread of the disease by personal infection was also favoured by the overcrowding which then existed at the depôt ;

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by the congregation of men at entertainments in the recreation room and soldiers' home, and by the assembling of the recruits at school. The disease was prevalent to some extent amongst the civil population in the vicinity. The epidemic ceased almost immediately after measures were taken to reduce overcrowding, which was effected by placing men in detachments in camp outside barracks and drafting them to empty barracks elsewhere, after a period of observation.

In Aldershot there were 87 admissions (with two deaths). It is stated that the disease was very prevalent amongst the civil population, especially during the latter half of the year. At Woolwich, where there were 27 admissions (with 2 deaths), it is also stated that the disease prevailed among the civil population. In London, 26 cases (with 2 deaths) occurred. Other stations showing more than one or two admissions were Portsmouth 18, Dublin 17, Shoeburyness and Hilsea 9 each, Gosport 8 (with 1 death), Warley and Guildford 6 each, Norwich and Western Heights, Dover, 5 each, Dorchester 4 (with 1 death), Fermoy 3 (with 1 death). A fatal case also occurred at York.

Measles was the cause of 177 admissions, but there was no mortality. The ratio per 1,000, 1·8, is exactly similar to that of the previous year, but is fractionally higher than the average rate for the preceding ten years.

The admissions numbered 79 in England and Wales, in Scotland 15, and in Ireland 83, as compared with 159, 8 and 17 respectively in the previous year.

The remaining admissions for *other eruptive fevers,* included 298 for cow-pox and 8 for chicken-pox.

Enteric Fever.—For this disease there were 88 admissions and 21 deaths; the corresponding numbers in the previous year being 94 admissions with 22 deaths. The ratios per 1,000 of admission and death are exactly the same as in 1896, but in comparison with the ten years' average rates there is a decrease of ·4 in that of admission, and of ·04 per 1,000, in that of mortality. The percentage of mortality to attack was 23·9 as compared with 23·4 in the previous year, and 20·1 the average for the preceding ten years. In England and Wales the admissions numbered 42 and the deaths 13, giving ratios of ·6 and ·18 respectively, the former being below the previous year's rate by ·1, but the latter showing an increase of ·07 per 1,000. There were 3 admissions in Scotland but no death, the ratio of admission being ·8, or an increase of ·2 on the preceding year's rate. In Ireland there were 43 admissions with 8 deaths, equal to ratios of 2·0 and ·35 per 1,000, there being no change in the rate of admission as compared with the foregoing year, while the death rate shows a decline of ·13 per 1,000.

No district was entirely exempt from the disease, but only single cases occurred in the Eastern, Home, and Channel Islands. As in previous years, the Dublin district contributed the highest number of any district, giving 23 admissions. The cases were distributed amongst 31 stations throughout the kingdom, Dublin, as a station, giving 18 admissions with 5 deaths. Of these, 7 cases with 3 deaths were from Richmond Barracks, 5 with 2 deaths from Portobello Barracks, 3 cases from the Royal Infirmary, and 1 case each from Linen Hall, Marlborough and Wellington Barracks. The 7 cases from Richmond Barracks were all men of the 2nd Hampshire Regiment, who had recently come off manœuvres and had left Birr but a short time previously. It was discovered that the men, while at the latter place, used to drink water from a polluted well, to which the disease was attributed. There were several pumps connected with wells in the barracks all labelled "for washing purposes only; not to be used for drinking." Some of these pumps had their handles removed and others had them secured to the pumps by chain and padlock, but, in connection with the particular well suspected, soldiers had been seen to slip the chain down and use the pump. The wells were subsequently pronounced dangerous, it having been found that they had been contaminated through defective drains, and their use was altogether abandoned. Several other cases of enteric fever occurred in this battalion, all attributed to the serious defects in the drainage of the Birr Barracks and the consequent pollution of the wells. Thus at Birr itself there were 3 admissions and 1 death just before the battalion left the station on 8th August, 2 cases after it arrived at the Curragh on 9th August, 5 cases and

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1 death after it arrived at Cork on 22nd September, and 1 case at Fermoy, so that the total number of cases which are said to have originated from the defects in Birr amounts to 18 with 5 deaths. Two men of the Medical Staff Corps contracted the disease while attending on cases in hospital. Of the five cases which occurred at Portobello Barracks the cause could not be traced, but they were believed to have been contracted in the town. In the remaining cases, one was contracted in hospital, one in lodgings in town, and in two others the cause was unknown. At Aldershot 10 cases occurred with 1 death. It was stated that of this number seven were imported and three of these are said to have been contracted at Island Bridge Barracks, where the 10th Hussars were quartered for a night, en route from the Curragh to Aldershot; three others occurred in men who had returned from furlough a short time before their admission into hospital, and one case was admitted four days after arrival with his regiment from Plymouth. For the other three cases no definite cause could be traced and it was thought probable that the disease was contracted outside barracks. At Cork 8 cases with 1 death occurred. Of these, 5, occurring in the 2nd Hampshire Regiment, have already been alluded to. The other three occurred in Cork Barracks, but the Courts of Inquiry could not assign any cause for the occurrence of the disease, the sanitary conditions of quarters and drainage being reported satisfactory. There were 6 admissions with 1 death at Woolwich; two of these were in men who had recently arrived in England, the disease having no doubt been contracted either abroad or on board ship, and in the remaining cases the origin could not be traced. At Western Heights, Dover, there were 4 admissions, but no case of mortality occurred. The first of these cases occurred in a non-commissioned officer on pass from Hythe; in two other cases the men had recently arrived from Fort George, N.B., at which station it was discovered that there had been a blocking of the drain at the guard-room, where the men had been on duty, and in the fourth case the disease was traceable to defective drainage in the block of barracks in which the man was living. The drains were thoroughly overhauled and the defects remedied. There were also 4 cases at Belfast. The source of the disease was not definitely traced in any instance, no sanitary defects in connection with the barracks being noted. One of the patients was a married man residing in the town, one was a recruit of fourteen days' service, from the country, the third could not attribute his illness to any particular cause, while the fourth was a young soldier, whose home is in Belfast, and who was in the habit of frequently visiting his parents, who lived in a very dirty street, with insanitary surroundings. Three admissions with 1 death at Birr, in men of the 2nd Battalion Hampshire Regiment have been alluded to already. At Shoeburyness there were also 3 admissions and 1 death. These were all believed to have been contracted outside barracks. There were 3 admissions at Shorncliffe in which the evidence pointed to infection from outside sources. The Curragh gave 3 cases, two of which as already stated were contracted at Birr. The other was supposed to have had its origin in London. Two cases with two deaths took place at Parkhurst, Isle of Wight. The first case was contracted at a village where the man had been visiting, some two miles from Parkhurst; the second was an imported case, the man having only been three days in the station when he reported sick. He had previously been at Winchester. At Chatham there were 2 admissions with 1 death, and the disease is said to have been contracted outside barracks. In Athlone, Tipperary, and Kilworth Camp there were 2 admissions each, without death. In the first named station one of the cases was in a man of the Medical Staff Corps who had been employed for some months in nursing cases of the disease in the Royal Infirmary, Dublin, in the other no definite opinion could be arrived at as to its origin. Of the next two cases one is stated to have occurred in the town (Tipperary), the other took place in barracks but its origin could not be traced. Of the two which occurred at Kilworth one is said to have been contracted on the line of march from Dublin, the other occurred in camp but the cause could not be traced to any local insanitary condition. At Leicester, Norwich, Devonport, Taunton, Portsmouth, and Fermoy there occurred one admission and one death in each. In the first case the man was married off the strength and lived in insanitary lodgings in town; in the second the man had assisted in

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cleaning out a drain, and it was supposed that the disease was contracted on that occasion, although under the heading of women and children some further facts are noted regarding enteric fever at Norwich; the third was that of a man from Crown Hill who probably contracted the disease in the town; the fourth case was in a man who had been apprehended as a deserter and was transferred to Taunton from the prison at Shepton Mallet, unsettled life and exposure being considered the factors in its origin; the fifth case was a man of the Hampshire Regiment who arrived from Cork and was admitted the same evening. Single cases also occurred at the following stations, viz.:—Pontefract, Bury (Lanc.), Liverpool, Pembroke Dock, Chichester, Hounslow, Alderney, Fort George, Hamilton, and Maryhill. The first was believed to have been contracted in the town; the second was in a man who lived in a house outside barracks, the drains of which were found to be defective; the third is said to have been contracted in Liverpool; in the fourth case (at Pembroke Dock) the man came from the hut encampment, but no cause could be discovered; the fifth case was that of a man who had been on the South-Eastern District Manœuvres, near Arundel, where the disease was probably contracted; in the sixth and seventh cases, the source was not traceable; in the eighth case, at Fort George, the disease was attributed to a choked drain in connection with the guard room (to which reference has already been made); the ninth case was due to an insanitary condition of quarters, and in the tenth the disease was believed to have been contracted outside barracks, as at the time there were several cases of the disease among the civil population. A death occurred at Chelmsford, the patient being a man who was undergoing imprisonment, and a man also died at Birmingham from enteric fever, while on furlough.

Table showing the stations in the United Kingdom at which the Admissions for and Deaths from Enteric Fever took place in each of the Four Quarters of the Year 1897.

District.	Station.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
North-Eastern	Leicester ..	—	—	—	—	—	—	1	1	1	1
	Pontefract ..	—	—	—	—	—	—	1	—	1	—
North-Western	Bury ..	—	—	—	—	1	—	—	—	1	—
	Liverpool ..	—	—	—	—	—	—	1	—	1	—
Eastern ..	.. Norwich ..	—	—	—	—	—	—	1	1	1	1
Western ..	Devonport ..	1	—	—	—	—	1	—	—	1	1
	Pembroke Dock	—	—	—	—	1	—	—	—	1	—
	Taunton ..	—	—	—	—	—	—	1	1	1	1
Southern..	Portsmouth..	—	1	—	—	1	—	—	—	1	1
	Parkhurst, I. of W.	—	—	—	—	1	—	1	2	2	2
Thames ..	Chatham ..	—	1	2	—	—	—	—	—	2	1
	Shoeburyness	—	—	—	—	1	—	2	1	3	1
South-Eastern	Dover, West. Heights	—	—	1	—	3	—	—	—	4	—
	Shorncliffe ..	—	—	2	—	—	—	1	—	3	—
	Chichester ..	—	—	—	—	1	—	—	—	1	—
	Cd. fwd. ..	1	2	5	—	9	1	9	6	24	9

(continued.)

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District.	Station.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
	Bt. fwd. ..	1	2	5	—	9	1	9	6	24	9
Home	Hounslow ..	—	—	1	—	—	—	—	—	1	—
Woolwich ..	Woolwich ..	2	—	1	—	2	—	1	1	6	1
Aldershot ..	Aldershot ..	3	—	3	—	3	1	1	—	10	1
Channel Islands..	Alderney ..	—	—	—	—	—	—	1	—	1	—
Scottish ..	Fort George	—	—	—	—	1	—	—	—	1	—
	Hamilton ..	—	—	—	—	—	—	1	—	1	—
	Maryhill, Glasgow	—	—	—	—	1	—	—	—	1	—
Belfast	Belfast ..	—	—	3	—	—	—	1	—	4	—
Dublin ..	Athlone ..	—	—	1	—	—	—	1	—	2	—
	Birr.. ..	—	—	—	—	3	1	—	—	3	1
	Dublin ..	1	—	3	—	10	3	4	2	18	5
Cork ..	Cork ..	1	—	—	—	6	1	1	—	8	1
	Fermoy ..	—	—	—	—	1	1	—	—	1	1
	Tipperary ..	1	—	—	—	1	—	—	—	2	—
	Kilworth ..	—	—	—	—	2	—	—	—	2	—
Curragh	Curragh ..	—	—	—	—	3	—	—	—	3	—
	Detached ..	—	—	—	—	—	—	—	2	—	2
	Total ..	9	2	17	—	42	8	20	11	88	21

The history of enteric fever amongst the troops during 1897 is chiefly remarkable for the outbreak among the men of the 2nd Battalion Hampshire Regiment, who contributed 18 cases, or over 20 per cent. of the total number of admissions in the United Kingdom and nearly 42 per cent. of the total number in Ireland. In the previous year the most serious outbreak occurred at Pembroke Dock, and in both these outbreaks definite causes of the disease were ascertained to exist inside barracks. It may be generally accepted that, where definite causes of the disease exist in barracks, a more or less numerous crop of cases arises, whereas isolated cases are probably contracted outside barracks.

Other continued fevers were the cause of 360 admissions, giving a ratio of 3·7 per 1,000 or ·8 in excess of the previous year's rate, but below the decennial average rate by ·4. The admission rate for England and Wales was 3·7, which is above the previous year's rate by 1·3 and the ten years average rate by ·2 per 1,000. In Scotland the rate of admission, 2·1 per 1,000, is below the previous year's and ten years' average rates by 3·0 and 3·6 respectively. The admission rate for Ireland was 4·1 per 1,000, showing a decrease of ·2 on the foregoing year and of 1·6 on the decennial average rate. The North-Eastern gave the highest rate (8·8) of any district, as was also the case in the previous year, the Aldershot, Dublin, Eastern, and Cork districts following with 5·8, 5·5, 5·2, and 4·5 per 1,000 respectively. The Thames, Channel Islands, Woolwich and North-Western districts furnished the lowest ratios, viz. :—·6, ·7, 1·3, and 1·5 per 1,000. One death is recorded under this heading and was due to Mediterranean fever. The man was admitted to hospital on his way home from Malta, having completed a tour of service at that station.

Influenza was the cause of 591 admissions as compared with 230 in the previous year. The cases were fairly equally distributed throughout the various districts with the exception of the Thames, Channel Islands, Cork, Belfast, and the North-Eastern districts, all of which returned only a few

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cases each. There were 44 admissions and 4 deaths from *diphtheria*. In 1896 there were 244 admissions and 1 death. 22 of the admissions occurred at Aldershot as compared with 177 in the preceding year. This improvement is attributed to a progressive amelioration of the sanitary state of the camp, by the extension of a modern system of drainage. Bacteriological examination was applied in every case, and to it is attributed greater accuracy in diagnosis. Antitoxin was used with beneficial results in most of the cases.

For *dysentery* 47 admissions and 1 death are recorded, against 46 admissions and 1 death in the foregoing year, showing no alteration in the ratios per 1,000. Forty-one of the cases (including the death) occurred in England and Wales, the remaining 6 in Ireland. The highest numbers were given by the South Eastern and Southern districts, viz., 12 and 10, and occurred chiefly amongst men who had recently returned from abroad.

Mumps gave 85 admissions as compared with 63 in the foregoing year.

Malarial Fevers were the cause of 500 admissions and 2 deaths, giving the ratios of 5·2 and ·02 per 1,000, which is a decrease of 2·9 in the admission rate, while the death rate is exactly the same as in the preceding year. In comparison with the decennial period a decrease of ·9 is shown in the rate of admission but there is a fractional increase (·01) in the mortality rate. Both of the deaths and 428 of the admissions took place in England and Wales. There were 7 admissions in Scotland, and the remaining 65 cases occurred in Ireland. England and Wales shows a decrease in the admission ratio, as compared with 1896 and with the decennial average rate, of 3·9 and 1·4 respectively. Scotland in similar comparisons shows an increase of ·2 and a decrease of ·9, and Ireland shows a decrease of ·4 as compared with the previous year but a slight increase as compared with the average rate for the preceding ten years. Out of the entire number of cases, 11 are recorded as remittent fever, and one of the deaths is shown under this heading.

Septic Diseases accounted for 54 admissions (of which 49 were cases of erysipelas) and 3 deaths, equivalent to ratios per 1,000 of ·6 and ·03 respectively, which are lower than the corresponding ratios in 1896 by ·3 and ·02, and than the decennial average rates by 1·2 and ·05. England and Wales furnished 42 of the admissions and 2 of the deaths, the ratios being ·6 and ·03, showing a decrease of ·3 and ·04 in comparison with the rates of the previous year and of 1·3 and ·06 as compared with the decennial averages. In Scotland 3 admissions occurred, giving a ratio of ·8, which is ·2 in excess of that in the previous year but 1·4 below the average rate. In Ireland there were 9 admissions with 1 death, the ratios being equivalent to ·4 and ·04 per 1,000, the former being below that of 1896 by ·5 but the latter showing an increase, as no death occurred in the previous year; while in comparison with the decennial average rates the admission rate shows a decline of 1·1 and the mortality rate a slight increase (·01).

The deaths from septic diseases in the United Kingdom were due to erysipelas, septicæmia and pyæmia, one death each.

Tubercular Diseases were the cause of 236 admissions and 51 deaths, equal to ratios of 2·4 and ·52 per 1,000, showing decrease of ·2 and ·09 respectively as compared with the previous year's rates, and of 1·4 and ·33 per 1,000, as compared with the decennial average rates. The ratios of admission and deaths in England and Wales were 2·5 and ·54 per 1,000 respectively, which are below the previous year's ratios by ·1 and ·05, and the average of the preceding ten years by 1·4 and ·32 per 1,000. Scotland with ratios of 2·6 and ·26 per 1,000 shows an increase in the admission rate of ·3 but a decrease in that of mortality of ·59 in comparison with the foregoing year, while in comparison with the average rates there is a decrease in the admission rate of ·9 and in that of mortality of ·59 per 1,000. In Ireland the ratios, 2·3 and ·48 per 1,000, show a decrease in each instance of ·7 and ·12 when compared with the preceding year's rates, and a still further decrease, viz., 1·3 and ·34 per 1,000 in comparison with the decennial average rates.

Tubercle of lung furnished 197 of the admissions and 44 of the deaths.

Venereal Diseases.—For *primary syphilis* there were 3,218 admissions, giving a ratio of 33·3 per 1,000, or 10·2 and 25·9, respectively, less than the previous year's and the average rate. The ratio of constantly sick for this affection was 3·39 per 1,000, being lower than in the previous year by ·91 and than the average for the preceding ten years by 2·21 per 1,000.

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For England and Wales alone the admission and constantly sick rates were 32·8 and 3·47 respectively, showing decrease in comparison with those of the preceding year of 14·6 and 1·24 and a still more marked decrease (31·6 and 2·66) as compared with the decennial rates. Scotland with ratios of 22·7 and 1·84 for admission and constantly sick shows an increase of 2·3 and ·19 on the rates for 1896, but, compared with the average rates of the preceding ten years, a decrease in both amounting to 5·4 and ·47 per 1,000 respectively. The ratios of admission and constantly sick for Ireland were 37·1 and 3·42 respectively, the former showing an increase of 2·2 and the latter no change, as compared with the previous year, but, as compared with the preceding ten years' average rates, there is a decrease of 11·8 and 1·15 per 1,000 respectively.

Soft Chancre was the cause of 1,177 admissions, and of 96·79 constantly sick, equal to ratios per 1,000 of 12·2 and 1·00. In England and Wales the admissions and constantly sick were 926 and 77·03, in Scotland 19 and 1·40, and in Ireland 232 and 18·36. Adding the sickness from this affection to primary syphilis the ratio of admission and constantly sick for *primary venereal sores* in the United Kingdom amounted to 45·5 and 4·39 respectively, a decrease of 11·7 and 1·03 as compared with 1896 and of 33·5 and 2·73 respectively in comparison with the decennial average rates. In England and Wales the admission and constantly sick rates amounted to 45·8 and 4·55 per 1,000, or a decrease on the previous year's rates of 14·9 and 1·23, and on the ten years' average rates of 39·3 and 3·20. Scotland with a rate of 27·7 for admission and of 2·21 for constantly sick shows a decline on the rates for 1896 of 8·9 and ·56 respectively, and on the decennial average rate of 22·5 and 1·47 per 1,000. The ratios in Ireland were 47·9 and 4·28 per 1,000, the decrease, as compared with the preceding year, being 1·6 and ·42 respectively, and as much as 17·8 and 1·52 per 1,000 when compared with the preceding ten years' average rates.

Secondary Syphilis.—The admissions numbered 2,919, the deaths 6, and men constantly ineffective from this cause 316·11. The ratios of admission and constantly sick were 30·2 and 3·27 per 1,000, which are below the previous year's rates by 2·1 and ·22, and those of the preceding ten years by 5·7 and ·28 per 1,000.

England and Wales gave admission and constantly sick rates of 32·0 and 3·64 per 1,000, being a decrease of 2·7 in that of admission and ·25 in that of constantly sick, while in comparison with the decennial average rates the decline amounted to 6·9 and ·31 per 1,000. The admission and constantly sick rates for Scotland were 15·6 and 1·16 per 1,000, which are below those of the preceding year by 12·4 and ·67, and also below the ten years' average rates by 14·5 and 1·00 per 1,000. In Ireland the respective ratios were 27·0 and 2·44 per 1,000, showing an increase in the admission rate of 1·4 but a decrease in that of constantly sick of ·09 as compared with 1896, while in comparison with the ten years' average rates the admissions show a decrease of 1·1 and the constantly sick one of ·18 per 1,000.

Gonorrhœa was the cause of 6,176 admissions, and 464·99 men were constantly ineffective from this disease, the ratios being 64·0 and 4·82 per 1,000 respectively, or 4·8 and ·21 below the previous year's ratios, and 22·2 and 1·06 less than the decennial average rates.

England and Wales contributed 4,667 of the admissions and 352·84 of the men constantly non-effective from this disease, the equivalent ratios being 65·4 and 4·94 per 1,000, which shows decrease of 5·5 and ·22 as compared with the previous year, and of 24·1 and 1·20 in comparison with the preceding ten years' average rates. The admission and constantly sick rates for Scotland for the year under report were 56·6 and 3·22 per 1,000, which are below those of the previous year by 7·7 and ·51 per 1,000, and the decennial average rates by 14·4 and ·58 respectively In Ireland the rates per 1,000 were 60·6 for admission and 4·68 for constantly sick, being less than those for 1896 by 2·6 and ·12, and than the average ratios by 18·2 and ·74 respectively.

Taking *all forms of venereal disease* together, the admissions in the United Kingdom numbered 13,490 and the constantly sick 1205·31. The total ratio of admissions for venereal diseases, therefore, was 139·7 and that of constantly sick 12·48 per 1,000, these ratios being lower than those of the preceding year by 18·6 and 1·46, and than the average of the pre-

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ceding ten years by 61·4 and 4·07 per 1,000, respectively.* For England and Wales alone, the ratios were 143·2 and 13·13 per 1,000, or 23·1 and 1·70 below the ratios in the foregoing year, and 70·3 and 4·71 below the decennial average rates. In Scotland, these ratios, 99·9 and 6·59 respectively, were 29·0 and 1·74 below those of the previous year, and 51·4 and 3·05 lower than the average of the preceding decennial period. In Ireland, the ratios were 135·5 and 11·40, showing decrease as compared with 1896 of 2·8 and ·63 per 1,000, and of 37·1 and 2·44 in comparison with the ten years' average rate.

The districts showing the greatest prevalence of venereal diseases were the Dublin, Western, Belfast, and Woolwich districts, with admission rates of 190·8 186·4, 180·6 and 179·8 respectively. The lowest rates were in the Cork, Scottish, South Eastern, and North Western districts, namely, 77·8, 99·9, 112·3 and 119·4. Compared with the distribution of venereal disease in the previous year, increase is observed in the admission rates of the Belfast, Channel Islands and Woolwich districts, of 41·0, 17·5 and 3·9 respectively, but in all other districts decrease has occurred, the most marked being a decrease of 53·2 in the Western district, 38·0 in the North Eastern, 31·6 in Aldershot, and 29·0 in the Scottish district.

Parasitic Diseases.—Under this heading are recorded 2,277 admissions and 73·75 constantly sick, the respective ratios being 23·6 and ·76 per 1,000. Scabies furnished 1,956 of the cases, equal to 86 per cent. of the total number of admissions for these diseases, while ringworm, with the next highest total, namely, 144, accounted for 6 per cent. The other forms of parasitic disease gave only a few isolated admissions each. In 1896 there were only 20 admissions under this head, and the great disparity between the large number of admissions in 1897 and the very small number recorded in the previous year is due to the introduction of the new nomenclature of diseases, in which a large number of diseases formerly shown under skin affections are now classed under the head of parasitic diseases. There was one death, namely, from echinococcus hominis.

For *scurvy*, only one admission is recorded, as compared with 6 in the foregoing year.

Alcoholism was the cause of 158 admissions and two deaths. Two of the admissions and one of the deaths were due to delirium tremens. Comparing one division of the Kingdom with another, it is found that in England and Wales the admission rate for alcoholism was 1·7 per 1,000, as compared with 1·9 in Scotland, and 1·4 in Ireland.

Under the head of *rheumatism* are recorded 2,515 admissions and 7 deaths, giving the ratios of 26·1 and ·07 per 1,000, respectively. Compared with the previous year, the admission rate shows a decrease of 3·0, but that of mortality an increase of ·02, while in comparison with the average rates the admissions show a decrease of 8·5, and the deaths an increase of ·02 per 1,000. For England and Wales the admission and mortality rates were 27·1 and ·07 per 1,000 respectively, the admission rate being lower by 3·3 and 9·6 per 1,000, as compared with the rates for the previous year and the decennial average, while the rate of mortality is higher by ·03 and ·01 per 1,000 respectively in the two comparisons. In Scotland, the admission rate, 14·8 per 1,000, was 9·8 below the previous year's rate, and 10·6 less than the average for the preceding ten years. Ireland, with admission and mortality rates of 24·4 and ·09 per 1,000 respectively, shows a decrease of 1·1 in the former, but a fractional increase in the latter. In comparison with the decennial average rates, the admission rate was less by 5·6, but the death rate higher by ·06. Of the total admissions 192 were for rheumatic fever, and all of the deaths were due to this cause.

Debility.—654 admissions are recorded under this head as compared with 737 in the previous year, showing a decrease of ·6 in the ratio per 1,000.

Under the heading *other general diseases*, 544 admissions and 11 deaths are shown, giving ratios of 5·6 and ·11 per 1,000. The admissions comprised

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*** There were 122 admissions for ulcer of penis of non-venereal origin, with 10·37 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the head of primary venereal sores, the admission and constantly sick rates for all forms of venereal diseases in the United Kingdom would equal 141·0 and 12·59 per 1,000 respectively.**

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232 cases of non-malignant new growth, 137 of anæmia, 21 of cyst, 12 of diabetes, 9 of malignant new growth, 36 congenital malformations, and 97 other ailments. The deaths were due to malignant new growth (6), diabetes (3), anæmia (1) and leucocythæmia (1).

LOCAL DISEASES.—*Diseases of the Nervous System.*—There were 744 admissions and 21 deaths, giving ratios of 7·8 and ·21 per 1,000 respectively, the former being ·1 higher and the latter ·01 lower than those of the preceding year. Compared with the decennial average rates, both rates show decrease, of ·7 per 1,000 in the admissions and ·11 in the mortality. For England and Wales the ratios of admission and mortality were 7·4 and ·22 per 1,000, which are lower than in 1896 by ·5 and ·01 respectively, and than the decennial average rates by 1·3 and ·11. Scotland gave a ratio of 9·5 per 1,000 for admission, which was an increase of 4·6 on the rate for 1896 and of 1·2 on the ten years' average rate. As in the previous year, there was no death. The ratios for Ireland were 8·7 and ·22 per 1,000, the increase on the previous year being 1·2 and ·02 respectively, while compared with the average rates that of admission shows an increase of ·6, but the death rate shows a decrease of ·06 per 1,000.

Amongst the admissions for diseases of the nervous system there were 121 (with 2 deaths) for *mental diseases*, giving an admission rate of 1·3, which differs from the previous year's rate only by an increase of ·1, and shows no change in comparison with the average rate. England and Wales shows a ratio of admission for mental diseases of 1·2, or ·1 less than in the previous year but exactly similar to the decennial average rate. Scotland with a rate of 2·1 was higher by 1·5 than in 1896, and than the decennial average by ·3 per 1,000. In Ireland the rate of admission was 1·4, which is above that of the previous year by ·4, but less than the average rate by ·2 per 1,000.

Excluding cases of mental disease, the principal causes of admission for nervous disorders were:—neuralgia, 296 cases; epilepsy, 137 cases; paralysis, 49 cases; diseases of the brain, spinal cord and their membranes, 28 cases; and apoplexy, 5 cases. The deaths were recorded under inflammation of the brain and its membranes, 8 cases, apoplexy, 4 cases, cerebral hæmorrhage, 2 cases, and abscess of the brain, paralysis of the brain, paraplegia, epilepsy, hyperæmia, dementia and general paralysis of the insane, one case each.

Diseases of the Eye were represented by 1,066 admissions, the ratio being 11·0 per 1,000, which is an increase of ·4 on the previous year but a decrease to a similar extent on the average rate. The ratio for England and Wales was 10·7 per 1,000, or ·4 above that of 1896, but ·6 below the decennial average rate. Scotland, with a ratio of 7·1 per 1,000, shows a decline on the previous year's and the preceding ten years' rates of 2·5 per 1,000 in each instance. In Ireland the ratio was 13·0 per 1,000, which is above that of 1896 and the average rate by 1·4 and 1·1 respectively. Conjunctivitis caused 644 admissions, keratitis, ulcer of the cornea, &c., 85, iritis 66, and various other affections 271.

Diseases of other Organs of Special Sense were the cause of 908 admissions, the equivalent ratio being 9·4 per 1,000, an increase as compared with the previous year of 1·2 and of 1·6 in comparison with the average rate.

In England and Wales the admission rate was 9·5 per 1,000, which is higher by 1·3 and 1·2 respectively than the ratios for the previous year and preceding ten years. Scotland, with a ratio of 6·3 per 1,000, exceeded the previous year's rate by 1·8 and the average of the preceding ten years by ·9 per 1,000. The ratio for Ireland was 9·7 per 1,000, which is above that of the previous year by 1·0 and the ten years' average by 2·8. Of the admissions, 523 were caused by inflammation of the external meatus of the ear, and 233 by inflammation, ulceration and perforation of the membrana tympani. For diseases of the nose there were 31 admissions. There were two deaths, one being due to inflammation of the middle ear and the other to necrosis of the internal ear.

Diseases of the Circulatory System caused 1,053 admissions and 35 deaths, giving ratios of 10·9 and ·36 per 1,000. The admission rate is lower by ·7 than in the previous year; but the death rate shows a slight increase (·01). Compared with the decennial average rates, that of admission has increased

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by 1·0, but the death rate has decreased by ·01. The admission and mortality rates in England and Wales were 10·6 and ·36 per 1,000 respectively, the former showing a decrease of ·1 and the latter an increase of ·04 as compared with the rates in the foregoing year; while, compared with the decennial average rates, that of admission shows an increase of ·6 and that of mortality a decrease of ·02. In Scotland these rates were, for the year under report, 6·6 and ·53 per 1,000, the former being above the previous year's rate by 1·8, but the latter ·32 less than it. Compared with the average ratios for the previous ten years, the admission rate shows a decline of 2·3; but the death rate an increase of ·04. Ireland, with admission and death rates of 12·6 and ·31 per 1,000 respectively, is lower in both instances than in 1896, to the extent of 2·9 and ·05 per 1,000, but, compared with the average rates, the admission rate shows an increase of 2·9, while a fractional decrease (·01) has taken place in that of mortality.

The chief causes of admission were disordered action of the heart, 570 cases, valvular disease of heart, 263 cases, varix 237, and phlebitis 17. The causes of death were valvular disease of heart, 17 deaths, aneurysm (of which 7 were aneurysm of the aorta) 8, fatty degeneration of heart, 4, and hypertrophy of heart, rupture of heart, rupture of artery, angina pectoris, embolism and syncope, one each.

Diseases of the Respiratory System furnished 4,435 admissions and 55 deaths, the equivalent ratios being 46·0 and ·56 per 1,000. The admission rate exceeds that of the foregoing year by 7·2, but the death rate is lower by 11. In comparison with the average rates for the preceding ten years, there is a decrease of 14·2 per 1,000 in admissions, and of ·60 in mortality.

England and Wales gave an admission rate of 48·5 and a mortality rate of ·56 per 1,000, the former being above the previous year's rate by 9·2 and the latter lower by ·16; but in comparison with the average rates decrease is shown in both ratios to the extent of 13·0 in that of admission and of ·64 in that of mortality. Scotland, with admission and mortality rates of 35·2 and 1·06 per 1,000 respectively, shows a decrease in the admission rate of 5·3 and in the mortality rate an increase of ·49 as compared with 1896, but in comparison with the average rates decrease has occurred in both rates amounting to 18·2 in the case of admissions and of ·33 in that of deaths. The ratios of admissions and deaths in Ireland were 39·3 and ·48 per 1,000 respectively, the former being above the corresponding rates in the preceding year by 2·3 and the latter below by ·08, while in comparison with the decennial average rates a decline of 18·0 and ·53 is observed. Bronchial affections were the chief form of sickness under this head, accounting for as many as 3,558 admissions to hospital. Pneumonia gave 394 admissions, pleurisy 249, and laryngitis 93.

The deaths were due to pneumonia in 34 instances, bronchitis in 11, phthisis in 3, and hæmoptysis in 2, while there was one death each from pleurisy, empyema, hæmorrhage of lung, broncho-pneumonia, and pneumothorax.

Diseases of the Digestive System were the cause of 9,085 admissions and 18 deaths, equal to ratios of 94·1 and ·18 per 1,000. There is scarcely any change in the admission or death rates in comparison with the previous year, a decrease of only ·1 and ·09 respectively being observed, but in comparison with the average rates a decrease of 11·6 has taken place in the rate of admission, and of ·14 in that of mortality. Of the admissions and deaths, England and Wales contributed 6,998 and 10 respectively, with ratios of 98·0 and ·14 per 1,000, the former showing an increase of 1·2 on that of the previous year, and the latter a decrease of ·09, while in comparison with the ten years' average rates a decline is noted of 12·5 and ·19 respectively in admissions and mortality. The admission rate in Scotland was 63·5 per 1,000, and the mortality was *nil*, a decrease as compared with last year's rates of 11·9 and ·28, and with the ten years' average ratios of 29·5 and ·30 per 1,000. In Ireland the admission rate was 86·4, and that of mortality ·35 per 1,000, the decrease as compared with 1896 being 2·6 and ·05, while in comparison with the average rates the admission rate shows a decline of 7·2, but that of mortality an increase of ·06. Among the cases treated were 6,037 for affections, of the mouth and throat, 924 for indigestion, 450 for diarrhœa, 335 for hepatic affections, (including 158 cases of jaundice,

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and 12 of abscess of liver), and 236 for piles. The deaths were :—4 from abscess of liver, 3 from peritonitis, 2 each from inflammation of liver, cirrhosis of liver, and ulceration of the intestines, and one each from enteritis, atrophy of liver, typhlitis, internal strangulation and post pharyngeal abscess.

Diseases of the Lymphatic System accounted for 956 admissions, the ratio 9·9 per 1,000 being lower by 2·7 than in the previous year, and by 5·9 than the average rate. The rate for England and Wales, 10·2, was less than that of the previous year by 3·1, and than the decennial rate by 6·6 per 1,000. Scotland, with an admission rate of 6·3 per 1,000, showed a decrease of 3·1 in comparison with the previous year's rate, and of 2·2 in comparison with the decennial average. Ireland had an admission rate of 9·5 per 1,000, or less than that of the preceding year and the average rate by 1·3 and 4·5 respectively. Inflammation and suppuration of the glands were the cause of the majority of the admissions, and 10 cases of goitre and 5 of splenitis were returned. There was no death.

Diseases of the Urinary System gave 186 admissions and 12 deaths, the equivalent ratios being 1·9 and ·12 per 1,000, which, in comparison with the previous year's rates, shows a decline in the former of ·2, but an increase in the latter of ·03. Compared with the decennial average, both rates are lower, by ·3 and ·02 respectively. For England and Wales the admission rate was ·1 above that of last year, and the death rate ·02 below, while, compared with the decennial average rates, that of admission shows a decline of ·3, and that of mortality one of ·01. Scotland shows a decrease in the admission rate of 2·5 in comparison with the previous year, and of 2·2 in comparison with the average. Ireland shows a decrease in the admission rate of ·8, and an increase of ·09 in the mortality rate as compared with 1896. Compared with the ten years' average there is practically no change. The majority of the admissions were due to incontinence of urine, 93 cases, Bright's disease 26, acute nephritis 24, cystitis 17, and hæmaturia 8 cases. The deaths were from Bright's disease (6), acute nephritis (5), and rupture of bladder (1).

Diseases of the Generative System.—The admissions numbered 2,330, and there was 1 death. The admission rate, 24·1 per 1,000, is below the rate in the previous year by ·4, and is also less than the average rate by 10·1 per 1,000. The admission rate for England and Wales (24·8 per 1,000) is above the previous year's rate by ·8, but is less than the average by 10·2 per 1,000. Scotland shows a decrease of 4·0 and 14·5 respectively in comparison with the previous year's and the average rates. Ireland also shows a decrease in each instance, amounting to 3·7 as compared with the previous year, and to 9·4 as compared with the average. Leaving out soft chancre, which has been previously referred to under venereal diseases, the chief causes of admission were orchitis (367), balanitis (349), varicocele (101), and stricture of urethra (74 cases). The one death recorded was due to extravasation of urine.

Diseases of the Organs of Locomotion.—The admissions were 1,239 in number with 2 deaths, equal to ratios of 12·8 and ·02 per 1,000 respectively. The admission rate shows an increase of 1·2 and 4·5 as compared with the previous year's and the average rates, but the death rate shows no change. The ratio of admission in England and Wales, 12·6 per 1,000, is an increase on that of the previous year of 1·2, and on that of the decennial average of 4·6 per 1,000. In Scotland the admission rate, 12·7 per 1,000, is almost the same as that recorded in the preceding year, but shows an increase on the average rate of 3·5 per 1,000. The admission ratio for Ireland was 13·6 per 1,000, which is higher by 1·4 than in 1896, and by 4·4 than the average rate. The principal causes of admission were: inflammation of joint 617, flat foot 123, myalgia 106, inflammation and contraction of tendons 89, inflamed bursa 55, and bunion 45 admissions. The deaths are recorded under caries of bone and necrosis of temporal bone, one death each.

Diseases of the Connective Tissue.—The admissions numbered 2,350, giving a ratio of 24·3 per 1,000, or 2·7 below that of the previous year, but above the average rate by ·7.

The admission rate in England and Wales, 23·4 per 1,000, was less than in the preceding year by 3·5, but exactly similar to the decennial average rate. In Scotland, the ratio, 24·8 per 1,000, exceeds that of the previous year by 1·3, but is below the average by 2·4. Ireland gave a ratio of 27·6 per 1,000,

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or ·3 below the previous year's rate, but 4·1 above the average. Of the admissions, 1,310 are shown as abscess, and 1,031 as inflammation of the connective tissue. There was one death from abscess.

Diseases of the skin caused 5,029 admissions, being in the ratio of 52·1 per 1,000. This is not comparable with the ratios published in former years, owing to some diseases formerly classed under this head being now included amongst parasitic diseases, in accordance with the revised nomenclature of diseases. On constructing, however, corrected ratios for previous years, it is found that an increase of 4·0 has occurred as compared with 1896, and of 5·8 as compared with the decennial average. England and Wales shows increase of 4·4 and 3·7 in these comparisons, Scotland increase of 10·0 and 3·8, and Ireland increase of 8·3 and 13·2. Boils were the cause of 1,695 admissions, eczema of 998, ulcer of 744, and whitlow of 768.

INJURIES.—The total number of injuries of all kinds amounted to 10,651, with 63 deaths, equal to ratios of 110·4 and ·65 per 1,000 respectively. In the previous year the ratios were 105·5 and ·55, while the average rates are 98·7 and ·67 per 1,000. For *general injuries* there were 35 admissions and 27 deaths, as compared with 37 admissions and 22 deaths in 1896. Heat stroke, sunstroke, and heat apoplexy caused 23 admissions, multiple injuries 7 and burns and scalds 5. The deaths were: 18 from drowning, 5 from multiple injury, 1 from sunstroke and 3 from suffocation. Of these three cases 2 died from strangulation (suicide), and the third was the case of a man who was found suffocated while lying with his face downwards, probably in a drunken stupor. The case of sunstroke occurred in August, and was that of a boy of the 1st Grenadier Guards, who was at the time on furlough at Reading.

Local injuries caused 10,616 admissions and 36 deaths, as compared with 10,489 admissions and 35 deaths in the previous year. The most frequent causes of admission were wounds, sprains, contusions, blisters of feet and abrasions. The deaths were: 14 from gunshot wound, 6 from fracture of skull, 4 from wound of neck, 2 from wound of skull, 2 from contusion of abdomen, 1 from contusion of abdomen with rupture of liver, 2 from compression of brain, 2 from fracture of spine, and one each from concussion of brain, dislocation of spine and fracture of pelvis.

POISONS.—There were 14 admissions and 6 deaths. Four of the cases are shown as lead poisoning, 3 poisoning by oxalic acid, 3 poisoning by decayed or poisonous food, and one case each of opium poisoning, carbolic acid poisoning, and snake bite.

In two of the cases of lead poisoning it is stated that the poisoning had commenced before enlistment, and in the other two, (one of which proved fatal), the men had been employed painting some railings in the barrack square, and it is supposed that they were poisoned "by rolling tobacco in their unwashed hands and smoking it." Two of the cases of oxalic acid poisoning occurred by drinking some tea from a tea bucket into which a comrade had carelessly thrown the remains of the acid he was cleaning his accoutrements with. Remedies were at once applied, and the men quickly recovered. In the third case the poison was taken with suicidal intent, and the man was afterwards invalided for dementia. The cases arising from decayed or poisonous food were caused by tinned salmon in two instances, and in the third instance, (fatal), by food in a state of decomposition. The case of opium poisoning occurred in a man who had taken a number of chlorodyne lozenges to alleviate a cough. This case recovered, but another case of chlorodyne poisoning, not shown as an admission, died out of hospital. The case of carbolic acid poisoning occurred by a man inadvertently drinking water out of a cup which contained carbolic acid.

The deaths were, 2 from cyanide of potassium, 1 each from hydrocyanic acid and chlorodyne, (all suicidal), 1 from ptomaine and 1 from lead poisoning.

SUICIDES.—There were 23 cases in 1897, as compared with 20 in 1896 and 21 the average for the preceding ten years. Sixteen of the suicides occurred in England and Wales, 3 in Scotland and 4 in Ireland. The mode

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of suicide was gunshot in 12 instances, cut-throat in four, poisoning in four, and hanging in two, while the remaining case was that of a man who died from multiple injury, by throwing himself in front of a railway train.

In 19 of the cases only were verdicts of temporary insanity or mental depression given.

In only two cases are motives for the act assigned, namely, recent reduction to the ranks in one, and in the other drink.

SURGICAL OPERATIONS.—Among the operations performed during the year, the following may be noted:—Amputation of leg, necessitated by gangrene, subsequent to ligature of femoral artery; amputation of ankle joint on account of tubercle of bone; several amputations of fingers and toes on account of injuries, deformities and contractions; three operations for tracheotomy, two of which proved fatal, and one for laryngotomy, with successful result; several operations involving incision and drainage of the pleural cavity, four of them necessitating resection of rib; four cases of excision of the eyeball on account of syphilitic disease or gonorrhœal ophthalmia; five cases of ligature of arteries, four on account of wounds and one on account of popliteal aneurysm; two cases of laparotomy, necessitated by gunshot wounds, both terminating fatally; one case of perineal section, on account of rupture of urethra, also with fatal result, and 12 operations for the radical cure of hernia. Besides these there was a large number of minor operations, such as excisions of tumours, aspiration and evacuation of abscesses, ligature and excision of veins on account of varix and varicocele, operations for fistula in ano, removal of piles, removal of glands, hydrocele, etc.

INVALIDING.—The number of men discharged the service in the course of the year on account of medical unfitness for further service was 1,953, giving a ratio of 19·87 per 1,000, which is lower by 1·33 than in the previous year, but above the average rate by 3·60 per 1,000. There were 1,360 men invalided in England and Wales, the ratio, 18·94 per 1,000, being lower than in 1896 by 1·95, but above the decennial average rate by 2·15 per 1,000. In Scotland, 46 men were discharged, giving a ratio of 12·16 per 1,000, or 8·24 below that in the foregoing year and 7·36 below the average rate. The number of men discharged in Ireland was 547, equal to a ratio of 23·95 per 1,000, which is higher than that of the previous year by 1·75, and than the decennial average rate by 9·59 per 1,000.

The principal causes of invaliding were, as in previous years, diseases of the circulatory system, for which 368 men were discharged (including 98 for disordered action of heart), the ratio per 1,000 being 3·74, or 1·25 below the previous year, but ·24 above the average. Diseases of the nervous system were next in frequency as causes of invaliding, 211 men being discharged under this head, the ratio, 2·15 per 1,000, showing a decrease of ·14 as compared with the previous year's rate, but exceeding the average rate by ·12; among the cases were 86 for mental affection, giving a ratio of ·88 per 1,000, which shows a decline of ·18 and ·02 as compared with the corresponding ratios for 1896 and the decennial period. Diseases of the organs of locomotion were the cause of 197 men being discharged, giving a ratio of 2·01 per 1,000, or ·05 below the preceding year's rate, but ·95 increase on the average rate. Tubercular diseases caused the discharge of 142 men, equal to a rate per 1,000 of 1·44, which is ·19 below the rate in 1896 and ·47 less than the decennial rate. Digestive disorders were answerable for the discharge of 179 men, the ratio per 1,000 being 1·82, which is an increase of ·41 on the previous year's rate and ·84 above the average rate. Diseases of the organs of special sense, excluding those of the eye, caused the discharge of 142 men, equivalent to a ratio of 1·44 per 1,000, or an increase of ·15 on the previous year's rate and of ·59 on the average rate. There were 85 men discharged for diseases of the eye, giving a ratio of ·87 per 1,000, or ·05 in excess of that for 1896, and ·18 above the decennial rate. For injuries 112 men were discharged, the equivalent ratio per 1,000 being 1·14, which is above the previous year's and average rates by ·25 and ·40 respectively. For secondary syphilis there were 102 men discharged the service, the ratio per

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1,000, 1·04, being less by ·26 than the rate in the previous year, but higher by ·17 than the ten years' average rate. For debility 90 men were invalided, equal to a ratio of ·92 per 1,000, showing a decrease as compared with the previous year of ·19, but an excess of ·02 on the average rate. The discharge of 73 men was due to respiratory affections, the ratio per 1,000 being ·74, or ·09 above the previous year's rate, but ·07 below that of the preceding ten years. The number of men discharged on account of rheumatism was 63, giving a ratio of ·64 per 1,000, which, while exactly the same as the average rate, is lower than in the previous year by ·25.

The ratios of invaliding for other diseases are very much the same as in 1896, showing, if anything, a slight decrease.

HEALTH STATISTICS ACCORDING TO AGE.

The following table has been prepared to show the influence of age on sickness, mortality, and invaliding among the troops serving in the United Kingdom during the year:—

Ages.	Average Strength.	Admissions.	Deaths.	Invalided.	Ratios per 1,000 of Strength.		
					Admissions.	Mortality.	Invaliding.
Under 20 years	27,627	20,564	50	468	744·3	1·81	16·94
From 20 to 25 years ...	36,457	31,094	104	983	852·9	2·85	26·96
„ 25 „ 30 „ ...	17,690	7,180	67	310	405·9	3·79	17·52
„ 30 „ 35 „ ...	8,580	1,840	53	92	214·5	6·18	10·72
„ 35 „ 40 „ ...	4,394	844	36	68	192·1	8·19	15·48
40 years and upwards ...	1,778	319	26	32	179·4	14·62	18·00
Total	96,526	61,841	336	1,953	640·6	*3·42	*19·87

* Calculated on strength including men detached (1,764).

From the above it will be seen that the highest admission rate at any age-period was among men between 20 and 25 years of age, namely, 852·9 per 1,000, the next highest ratio being 744·3, among men under 20 years of age. The quinquennial periods following the period 20 to 25 years show a considerable decrease, the number of admissions per 1,000 declining as the age increases.

The mortality rate, on the other hand, follows an opposite course, being lowest among men under 20 years of age, and steadily increasing as years advance. This corresponds with what obtained in the preceding year.

The ratio of invaliding was highest among men between 20 and 25 years of age but otherwise followed an irregular course. It was least among men between 30 and 35 years of age. The ratios of invaliding according to age do not follow the same sequence as the corresponding ratios in 1896.

HEALTH STATISTICS ACCORDING TO LENGTH OF SERVICE.

The following table shows the influence of length of service on the various rates :-

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Service.	Average Strength.	Admissions.	Deaths.	Invalided.	Ratios per 1,000 of Strength. Admissions.	Ratios per 1,000 of Strength. Mortality.	Ratios per 1,000 of Strength. Invaliding.
Under 1 year	26,657	23,348	43	470	875·9	1·61	17·63
From 1 to 2 years ..	16,792	11,830	29	397	704·5	1·73	23·64
,, 2 ,, 3 ,, ...	9,873	6,789	29	232	687·6	2·94	23·50
,, 3 ,, 4 ,, ..	7,735	4,084	21	162	528·0	2·71	20·94
,, 4 ,, 5 ,, ..	7,307	3,651	22	146	499·7	3·01	19·98
,, 5 ,, 10 ,, ..	14,795	8,828	79	338	596·7	5·34	22·85
10 years and upwards ...	13,367	3,311	113	208	247·7	8·45	15·56
Total	96,526	61,841	336	1,953	640·6	*3·42	*19·87

* Calculated on strength including men detached (1,764).

The highest admission rate, it will be observed, occurred among men having less than one year's service. This is followed by a steady decrease up to the fifth year of service. Then an increase is shown in the period 5 to 10 years' service, which is followed by the lowest admission ratio of all, namely, in men with 10 years' service and upwards. The sequence of these ratios is the same as in the preceding year. The mortality on the other hand was lowest among men in their first year's service, and highest amongst men with 10 years' service and upwards. This is influenced, of course, by the average ages of the different years of service. As in the case of the preceding year, invaliding was highest among men of from 1 to 2 years' service, followed closely by those having 2 to 3 years' service. The lowest rate occurred among men with 10 years' service and upwards. The admission ratios, as compared with the corresponding rates in the preceding year, show a decline in all groups of years of service except in the groups under 1 year, 2 to 3 years, and 5 to 10 years. The mortality rates show a decrease in all but the groups 3 to 4 years, and 4 to 5 years. The invaliding ratios show a decrease in every period.

HEALTH STATISTICS ACCORDING TO DISTRICTS.

The admissions, deaths, invalids discharged the service, average number constantly sick, average sick time to each soldier, and average duration of each case of sickness in the various military districts are shown in the following table:—

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Military Districts.	Average Annual Strength.	Admissions into Hospital.	Deaths.			Invalids discharged the Service.	Average Number Constantly Sick.	Ratio per 1,000 of Mean Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
			With the Regiment.	Absent from the Regiment.	Total.			Admitted into Hospital.	Died.	Invalids discharged the Service.	Constantly Sick.		
												days.	days.
1. North-eastern	4,679	3,061	25	—	25	61	145·69	654·2	5·34	13·03	31·14	11·37	17·37
2. North-western	4,705	2,657	9	1	10	57	119·42	564·7	2·12	12·11	25·38	9·26	16·40
3. Eastern...	4,647	3,643	19	—	19	95	190·72	783·9	4·09	20·44	41·04	14·98	19·11
4. Western	6,411	4,094	22	1	23	127	262·01	638·6	3·59	19·81	40·87	14·92	23·36
5. Southern	7,953	5,375	35	3	38	142	322·20	675·4	4·77	17·84	40·49	14·78	21·88
6. Thames...	4,667	2,361	13	2	15	58	136·85	505·9	3·21	12·43	29·32	10·70	21·16
7. South-eastern	7,195	4,590	13	1	14	161	249·16	646·0	1·97	22·66	35·07	12·80	19·81
8. Home	7,760	5,244	31	2	33	204	410·83	675·8	4·25	26·29	52·94	19·32	28·59
9. Woolwich	4,738	2,680	18	3	21	75	216·79	565·6	4·43	15·82	45·75	16·70	29·52
10. Aldershot	17,266	11,726	47	3	50	358	696·39	679·1	2·90	20·74	40·33	14·72	21·68
11. Channel Isles	1,438	720	6	—	6	22	39·25	500·7	4·16	15·22	27·23	9·96	19·90
12. Scottish	3,782	1,916	11	—	11	46	93·08	506·6	2·90	12·62	24·61	8·98	17·73
13. Belfast	3,472	2,197	7	—	7	105	120·24	632·8	2·02	30·24	34·63	12·04	19·98
14. Dublin	6,232	4,644	27	2	29	250	282·61	745·2	4·66	40·11	45·35	16·55	22·21
15. Cork	7,986	4,480	23	1	24	118	231·38	561·0	3·01	14·77	28·97	10·57	18·85
16. Curragh	3,680	2,453	9	2	11	74	146·34	668·6	2·99	20·11	39·77	14·51	21·77
Total	96,526	61,841	315	21	336	1,953	3,662·96	640·6	*3·42	*19·87	37·95	13·85	21·62
Average of 10 years, 1887 to 1896	1,002,410	737,667	4,430	362	4,792	16,657	42,614·20	735·9	*4·68	*16·27	42·51	15·52	21·04

* Total deaths and invalids calculated on strength including men detached.

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It will be seen that the highest *rate of admission* in any district was in the Eastern, 783·9 per 1,000, followed by 745·2 in the Dublin district and 679·1 in Aldershot. The lowest ratio was 500·7 and occurred in the Channel Islands, the next lowest being 505·9 in the Thames district and 506·6 in the Scottish district. In 1896, the Dublin district stood highest, with the Eastern as next highest, while the Curragh and the Thames districts had the lowest ratios. The Curragh, North Eastern, Belfast, Aldershot, Home and Southern districts show an increase of 140·0, 61·2, 42·5, 31·9, 31·6 and 26·9 respectively in the admission ratios, a decrease being observed in all other districts, notably in the North Western, Western and Dublin districts, where the ratios are 89·5, 81·4 and 71·0 per 1,000 respectively lower than in 1896.

The highest *death rate* is shown in the North Eastern district, 5·34, the next in order being the Southern, Dublin, Woolwich and Home districts, with 4·77, 4·66, 4·43 and 4·25, per 1,000. In the previous year the highest death rates were in the Southern and Western districts. The lowest death rates were observed in the South Eastern, Belfast, North Western, Aldershot and Scottish districts, with 1·97, 2·02, 2·12, 2·90 and 2·90 respectively. In the previous year the lowest rates occurred in the Curragh, Aldershot and South Eastern districts. Compared with 1896, the rates have increased in the North Eastern, Home, Eastern, Curragh, Woolwich, Dublin and Aldershot districts, while in all the remainder decrease has occurred, the most marked being decreases of 1·83 in the Belfast and 1·75 in the North Western district.

With regard to *invaliding*, the highest ratios are shown in the Dublin, Belfast, Home and South Eastern districts, with 40·11, 30·24, 26·29 and 22·66 respectively. The lowest rates occurred in the North Western, Thames, Scottish and North Eastern districts, with 12·11, 12·43, 12·62, and 13·03. In comparison with the previous year, increase has occurred in the Dublin and Curragh districts to the extent of 10·35 and 7·82 respectively, while decrease is noticed in the Channel Islands, Scottish, Home and Belfast districts of 10·46, 7·78, 6·62 and 5·68 respectively.

The ratios of *constantly sick* were highest in the Home, Woolwich and Dublin districts, with 52·94, 45·75, and 45·35 respectively, while the lowest ratios were in the Scottish, North Western, Channel Islands and Cork districts, with 24·61, 25·38, 27·23, and 28·97 respectively. In comparison with the rates in 1896, increase has occurred, but only to a slight extent, in the Home, Aldershot, Scottish, Cork and Curragh districts, while decrease has occurred in the remaining districts.

The *average sick time* to each soldier was highest in the Home district, with 19·32 days. Woolwich comes next with 16·70, and then Dublin, with 16·55 days, the latter showing the highest average (18·52) in 1896. The districts showing the lowest sick time were the Scottish, with 8·98, the North Western with 9·26, and the Channel Islands with 9·96 days. Increase is observed in the Curragh, Home, Scottish, Aldershot and Cork districts, the remaining districts all showing decrease.

For the *average duration* of cases of sickness the highest figures, as in the previous year, were given by Woolwich, with 29·52 days, the Home district coming next with 28·59 days, and then the Western, Dublin and Southern districts with 23·36, 22·21, and 21·88 days respectively. The lowest periods occurred in the North Western, North Eastern, Scottish and Cork districts, with 16·40, 17·37, 17·73, and 18·85 days. As compared with 1896, increase is shown in the Scottish, Western, Channel Islands and North Western districts of 1·90, 1·18, 1·12, and 1·11 days respectively, while decrease of 2·87, 2·17, 1·63, and 1·43 days has occurred in the North Eastern, Southern, Belfast and Curragh districts. In other districts the increase or decrease is only fractional.

HEALTH STATISTICS ACCORDING TO ARMS OF THE SERVICE.

The following table, compiled from the Returns of Principal Medical Officers, shows the admissions, deaths, number of men invalided, and number constantly sick, from each arm of the service, with the ratios per 1,000 of the strength, and the corresponding ratios for the previous ten years :—

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Arms of the Service.	Average Strength.	Admitted into Hospital.	Died.	Discharged as Invalids.	Average Number constantly Sick.	Annual Ratio per 1,000 of Strength.				Average of 10 Years, 1887-96.			
						Admitted.	Died.	Invalided.	Constantly Sick.	Admitted.	Died.	Invalided.	Constantly Sick.
Household Cavalry ...	1,179	693	3	25	42·91	567·8	2·54	21·20	36·39	641·2	3·49	19·98	32·61
Cavalry	9,537	6,715	38	230	404·26	704·1	3·98	24·12	42·39	795·1	4·20	17·49	45·93
Royal Artillery ...	16,237	8,686	65	232	527·51	534·9	4·00	14·29	32·49	679·1	5·63	16·08	41·06
Royal Engineers ...	4,389	1,401	16	41	77·92	319·2	3·64	9·34	17·75	488·6	5·51	10·03	27·72
Foot Guards	5,239	3,572	22	127	330·22	681·8	4·20	24·18	63·03	820·6	4·68	23·08	63·29
Infantry	40,572	30,754	113	1,073	1817·09	758·0	2·78	26·45	44·79	832·8	4·08	18·83	48·19
Regimental Depôts ...	12,166	7,598	51	151	300·71	624·5	4·19	12·41	24·72	637·0	6·38	11·58	26·33
Garrison Staff and Departments.	7,207	2,422	28	74	162·34	336·0	3·88	10·26	22·52	431·4	5·24	9·29	26·26

The highest rate of admission in any arm of the service was 758·0 per 1,000, in the Infantry, the next being 704·1 per 1,000, in the Cavalry, and the lowest 319·2 per 1,000, in the Royal Engineers, the next lowest being 336·1 per 1,000, in the Garrison Staff and Departments. In the previous year the Infantry and Cavalry were also highest, and the Garrison Staff and Engineers the lowest. Taking the ten years' average, the highest admission rate was in the Infantry and the lowest in the Garrison Staff and Departments.

The highest mortality rate occurred in the Foot Guards, 4·20 per 1,000, the next being 4·19 per 1,000, in the Regimental Depôts. In the previous year the highest rate was in the Regimental Depôts and the next highest in the Royal Artillery. The lowest death' rates in the year under review occurred in the Household Cavalry, with 2·54 per 1,000, and in the Infantry, with 2·78 per 1,000. In the preceding year the Cavalry and Foot Guards gave the lowest rates.

Invaliding was highest in the Infantry, with a rate of 26·45 per 1,000, the next highest rate being in the Foot Guards, with 24·18; while the lowest rates occurred in the Royal Engineers, with 9·34, and in the Garrison Staff, with 10·27, per 1,000. The Foot Guards and Household Cavalry furnished the highest rates in 1896, and the lowest were, as in the year under report, in the Royal Engineers and Garrison Staff.

The highest rate of constant inefficiency from sickness was in the Foot Guards, with 63·03 per 1,000, followed by the Infantry, with 44·79 per 1,000. The lowest rate 17·75 per 1,000, was in the Royal Engineers, the next, 22·52 per 1,000, being in the Garrison Staff and Departments. The same arms, in similar order, furnished the highest and lowest rates in the preceding year.

The admission rate as compared with that of 1896 has decreased in all arms of the service with the exception of the Foot Guards, Regimental Depôts and Garrison Staff and Departments. The mortality rate shows increase in the Household Cavalry, Cavalry of the Line and Foot Guards, all others showing decrease. The invaliding rate has increased in the Cavalry and Infantry only, as compared with the previous year.

In comparing these ratios with those of the decennial average, decrease is observed in every instance in the admission and mortality rates, and also in the constantly sick rates, with a single exception, that of the Household Cavalry, while the invaliding showed increase in the Household Cavalry, Cavalry, Foot Guards, Infantry, Regimental Depôts and Garrison Staff and Departments.

In Abstract XXV will be found a table showing the general health statistics of individual corps serving in the United Kingdom during the year.

OFFICERS, WOMEN AND CHILDREN.

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The principal statistics of sickness and mortality amongst officers, women and children, according to the several sections of disease, are shown in Abstract D, compiled from the Annual Returns of Principal Medical Officers of Districts.

OFFICERS.—The average strength is given as 4,001, the number of admissions 1,194, and the number of deaths 17. The ratio of admission was therefore 298·4 and the ratio of mortality 4·25 per 1,000; the former being lower by 5·2, and the latter higher by ·03 than the corresponding ratios in 1896.

General Diseases.—Twenty-one admissions are returned for *eruptive fevers*, being in the ratio of 5·2 per 1,000, which is fractionally above the previous year's rate. The cases comprised 12 of measles, 5 of scarlet fever, 2 of chicken-pox, and 1 each of cow-pox and rubella. *Influenza* shows 138 admissions and 1 death, as compared with 69 cases (1 fatal) in 1896. *Enteric fever* was the cause of 3 admissions and 1 death, being in the ratios of ·8 and ·25 per 1,000, as compared with 2·5 and ·25, the corresponding ratios in the preceding year. The stations where the cases occurred were Woolwich, Ballincollig and the Curragh. The case at the Curragh was contracted in Dublin, while the origin of the others is not stated. *Other continued fevers* caused 35 admissions, or 8·7 per 1,000, which is above the corresponding rate in 1896 by 2·0. With the exception of one admission for Mediterranean fever, all were cases of simple continued fever. There were 6 cases of *dysentery*, the admission rate, 1·5 per 1,000, showing a slight decrease as compared with the previous year's rate. Fifty-three admissions for *malarial fevers* are shown, the ratio, 13·2 per 1,000, being slightly below the corresponding rate in the previous year; 49 of the cases were ague and 4 remittent fever. *Septic diseases* caused 2 admissions and 1 death, as compared with 4 admissions and no death in the preceding year. The admissions were due one each to erysipelas and septicæmia, the latter proving fatal. Thirteen cases of *venereal disease* are shown, as compared with 15 in the preceding year. Of the cases 2 were primary syphilis, 1 secondary syphilis, 1 soft chancre and the remainder gonorrhœa. Fifty-four cases of *rheumatism* are returned, being in the ratio of 13·5 per 1,000. This is a decrease of 4·1 per 1,000 as compared with the corresponding rate in 1896. Seven of the cases were shown as rheumatic fever. Under the head of *debility*, 10 cases are returned, as compared with 21 in the previous year.

Other General Diseases gave 15 admissions, including 11 of mumps, 2 of anæmia and one each of non-malignant and malignant new growth. There were 3 deaths, 2 from cancer, and one from tumour.

Local Diseases.—*Diseases of the Nervous System* caused 20 admissions, being in the ratio of 5·0 per 1,000, which is 3·0 below the corresponding rate in the previous year; 15 of the cases were forms of neuralgia. There were only 2 cases of mental disease. One death occurred from epilepsy.

Diseases of the Organs of Special Sense gave a sick rate of 4·3 per 1,000, as compared with 6·2 in the previous year. Of the 17 cases giving this ratio, 12 were ophthalmic affections, principally conjunctivitis, 3 aural affections, and 2 diseases of the nose.

Diseases of the Circulatory System caused 10 admissions, and 3 of the cases proved fatal, being in the ratios of 2·5 and ·75 per 1,000 respectively, both higher than the corresponding ratios in the previous year. The diseases causing death were valvular disease of the heart, aneurysm of aorta, and dilatation of heart.

Diseases of the Respiratory System gave 140 admissions and 1 death, the ratios being 35·0 and ·25 per 1,000 respectively. The former is lower by 2·0 and the latter by ·25 than the corresponding ratios in the preceding year. Of the cases 120 were bronchial affections, 6 pleurisy, and 4 pneumonia. The fatal case was a case of pneumonia.

Diseases of the Digestive System caused 203 admissions and 2 deaths, being in the ratios of 50·7 and ·50 per 1,000 respectively. Compared with corresponding ratios for the previous year a decrease of 6·6 has occurred in the

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ratio of admissions and of ·24 in that of mortality. The principal causes of sickness under this head were affections of the mouth and throat, 78 cases, hepatic affections, 33, dyspepsia, 23, colic, 13, and diarrhœa, 12 cases. One of the deaths was due to hæmatemesis, and the other to ulcer of stomach.

Diseases of the Lymphatic System gave a ratio of 3·0 per 1,000, nearly double the previous year's rate. *Diseases of the urinary system* were the cause of 19 admissions, the majority being cases of cystitis.

Diseases of the Generative System caused a sick ratio of 4·7 per 1,000, a fraction higher than the corresponding rate in the previous year. *Diseases of the organs of locomotion* accounted for 65 admissions, 36 being due to synovitis and 14 to myalgia, the ratio, 16·2 per 1,000, shows an increase of 3·1 as compared with the corresponding rate in the previous year. *Diseases of the connective tissue* gave 33 admissions, or 8·2 per 1,000, being a decrease of ·7. The 40 admissions for *skin diseases* give a ratio of 10·0 per 1,000, as compared with 10·2 in 1896.

Injuries were 266 in number, equal to 66·5 per 1,000, a decrease of 6·2 as compared with the corresponding rate in the preceding year. The most common injuries were sprains, contusions and wounds. Among the more serious injuries were 28 cases of fracture of bones, 16 of concussion of brain and 4 of dislocation of joints. Three deaths occurred, two from gun-shot wound (1 suicidal and 1 the result of an accident on a rifle range), and the third, cut throat, also suicidal.

Poisons.—There was only one admission under this heading, a case of poisoning from eating oysters. One death occurred from narcotic poisoning.

WOMEN.—The annual returns give the average strength of women borne on the strength of the army in the United Kingdom as 11,122. The number of cases of sickness, exclusive of uncomplicated cases of parturition, was 3,852 and the number of deaths 45. The ratio of sickness to strength was 346·3 per 1,000, and the ratio of mortality 4·05. Compared with the returns for the previous year there is an increase of 34·7 in the sick rate and of ·39 in the death rate.

General Diseases.—Thirty-seven admissions, equal to a ratio 3·2 per 1,000, are returned under the head of *eruptive fevers*. This ratio is identical with the corresponding ratio in the previous year. The cases were 19 of measles, 17 of scarlet fever (2 fatal) and 1 of chicken pox. *Influenza* caused 197 admissions, as compared with 68 in 1896. There were 6 cases of *diphtheria*, as compared with 9 in the previous year. Four of the cases occurred at Aldershot. *Enteric fever* caused 10 admissions, being in the ratio of ·9 per 1,000, which is higher than the corresponding rate in the previous year by ·3. Three of the cases occurred in Dublin, two among women living out of barracks, the milk supply being suspected as the origin of one case, while the other was attributed to eating oysters. The third occurred at Portobello Barracks, the cause being untraced.

Two cases occurred at Norwich, one attributed to insanitary lodgings in the town, and the other to defective drainage of the Cavalry barracks. In connection with the latter case, it is mentioned that the patient, six months previously, had washed the soiled linen of another patient who was found afterwards to have been suffering from enteric fever and it is supposed that in this way she polluted the sink waste-pipe, &c., of the quarter in which she was living. Another case, attributed to the same insanitary conditions occurred, in a woman who was transferred from Norwich to Colchester before the disease developed itself. Several cases, as noted below, also occurred amongst the children at Norwich.

The remaining enteric fever cases occurred as follows:—1 at Mullingar, in lodgings; 1 at Windsor, probably contracted while in residence at Clapham; 1 at Cork, in a woman of the Hampshire Regiment, from Birr, where the outbreak of enteric fever has already been noted; and 1 at Belfast, in a woman living out of barracks.

Other Continued Fevers caused 24 admissions, equal to 2·1 per 1,000, which is identical with the corresponding rate in the previous year. There was one case of Mediterranean fever, and the remainder were cases of the simple continued fever type. There were 8 attacks of *dysentery*, the sick rate, ·7 per 1,000, being the same as in the preceding year. Fifty-three cases of *malarial*

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fever occurred, being in the ratio of 4·8 per 1,000, which is a fraction lower than the corresponding rate in the previous year. The cases comprised 48 of ague, and 5 of remittent fever. *Septic diseases* caused 21 admissions and 4 deaths, being in the ratios of 1·9 and ·36 per 1,000 of the strength respectively. The ratio of sickness is lower than that of the previous year by ·2, while the ratio of mortality remains the same. Of the cases 13 were erysipelas, and the remainder septicæmia. All the deaths were due to the latter disease. *Tubercular diseases* were the cause of 43 admissions and 6 deaths, being in the ratios of 3·9 and ·54 per 1,000, as compared with 3·7 and ·98 per 1,000 in the preceding year. 35 of the cases of tubercular affections were returned as tubercle of the lungs, and all the deaths were due to this cause.

Venereal diseases caused 11 admissions, as compared with 5 in 1896 ; 10 of the cases are returned as secondary syphilis, and there was one admission for gonorrhœa ; 11 cases of *parasitic diseases* are returned, and 2 of *alcoholism*. In the previous year there were 4 of the former and one of the latter. *Rheumatism* was the cause of 152 admissions, equal to a ratio of 13·7 per 1,000, which is fractionally above the corresponding rate in the previous year. There were 13 cases of rheumatic fever. Under the head of *debility* as many as 708 cases are returned, being in the ratio of 63·7 per 1,000, which is less by 1·0 than the corresponding rate in the preceding year. One death is recorded. Among the 117 admissions for *other general diseases*, anæmia is shown as the cause of 85 admissions, mumps 13, malignant new growth 9 (6 fatal), and non-malignant new growth 7.

Local Diseases. — *Diseases of the Nervous System*. The number of admissions under this head was 164, with 3 deaths, constituting a sick rate of 14·7, and a death rate of ·27 per 1,000, the former being lower by 2·0, and the latter higher by ·18 than the corresponding ratios in the previous year. Neuralgia was the principal disease, as many as 100 of the admissions being due to this cause. Among the remaining cases were 25 of hysteria, 13 of epilepsy, and 5 of mental disease. The fatal cases are recorded as apoplexy, epilepsy, and eclampsia, one case each.

Diseases of the Eye gave a sick ratio of 3·9 per 1,000. The cases numbered 43, of which 26 were cases of conjunctivitis.

Diseases of other organs of Special Sense gave only 14 admissions, 10 of which were aural affections and 4 diseases of the nose.

Diseases of the Circulatory System. Under this head 79 admissions and 2 deaths are returned, the ratios being 7·1 and ·18 per 1,000 respectively. The former shows an increase of ·3, and the latter a decrease of ·18 as compared with the corresponding ratios in the previous year. The principal causes of sickness were varicose veins 27 cases, valvular disease of the heart 25, disordered action of the heart 8, phlebitis 7. The fatal cases are recorded as degeneration of the heart and obstruction or occlusion by a clot in an artery.

Diseases of the Respiratory System caused a ratio of sickness equal to 49·4 per 1,000, which is above that of the previous year by 10·8 ; the mortality rate was ·63, an increase of ·18. Out of 549 admissions, 470 were cases of bronchial affections, and among the remainder were 24 of pneumonia, 22 of pleurisy, and 16 of asthma. There were 7 deaths, 5 being from pneumonia, and one each from bronchitis and phthisis.

Diseases of the Digestive System caused 781 admissions and 5 deaths, being in the ratios of 70·2 and ·45 per 1,000 respectively, both higher than the corresponding rates in the previous year. The greater part of the sickness from these diseases was due to affections of the mouth and throat and dyspepsia ; there were also many cases of diarrhœa and colic. Hepatic diseases caused 18 admissions, one of which was a case of jaundice. There were 2 deaths from peritonitis, and one each from diarrhœa, inflammation of liver, and ulceration of the stomach.

Diseases of the Lymphatic System gave a sick rate of ·8 per 1,000, as compared with 1·3, the corresponding rate in 1896.

Diseases of the Urinary System caused 21 admissions and 4 deaths, being in the ratios of 1·9 and ·36 per 1,000 respectively, as compared with 1·9 and ·09 in the preceding year. The chief causes of sickness were Bright's disease and cystitis. All the deaths were due to Bright's disease.

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Diseases of the Generative System accounted for 521 admissions and 4 deaths, the ratios being 46·8 and ·36 per 1,000 respectively. The corresponding ratios in 1896 were 38·2 and ·36 per 1,000. 202 of the cases were dependent on affections connected with pregnancy, 13 on diseases connected with parturition, 142 were cases of functional disorders, 78 were uterine disorders, 14 ovarian, and 68 affections of the breast. The fatal cases were recorded as sudden death after delivery (2 cases), and peritonitis and post-partum hæmorrhage, one case each.

Diseases of the Organs of Locomotion gave a ratio of sickness of 2·9 per 1,000, *diseases of the connective tissue* one of 5·7 per 1,000, and *diseases of the skin* one of 9·3 per 1,000; the first and last ratios being above and the remaining ratio below the corresponding ratios in the previous year.

Injuries. 73 are recorded, being in the ratio of 6·6 per 1,000, as compared with 5·1 in the preceding year; 62 of the injuries were cases of contusion, wounds, sprains or burns and scalds. There were 7 cases of fracture of bones, and one of dislocation of joints. One death occurred from fracture of tibia and fibula complicated with paralysis.

CHILDREN.—The average number of children as shown in the annual returns was 21,764. The attacks of illness numbered 12,008 and the deaths 443, giving a sick rate of 551·7, and a death rate of 20·36 per 1,000. Compared with the corresponding ratios in the previous year, an increase of 31·3 has occurred in the rate of sickness, and of 3·79 in that of mortality.

General Diseases.—There were 2,342 admissions and 48 deaths under the head of *eruptive fevers*, being in the ratios of 107·6 and 2·20 per 1,000 respectively, as compared with 111·2 and 1·19 in the previous year. *Measles* accounted for 1,536 of the cases, or 243 less than in 1896. The number of deaths was, however, 30 as compared with 19. The stations where the greatest number of admissions occurred were Dublin 174 cases, Aldershot, 125, Fermoy 85, Portsmouth 81, Shorncliffe, 80, Cork 79, Preston 79, the Curragh 67, London 45, Brecon 42, Fort George 41, Colchester and Warwick 39 each, Belfast 38, and Dover 37 cases. *Scarlet fever* attacked 359 children and there were 18 deaths, 148 of the cases, with 11 deaths, occurring at Aldershot, 29 cases (no death) at Woolwich, and 21 cases in London, while the remainder were widely distributed. In the previous year there were 240 admissions and 7 deaths. The other cases of eruptive fever were 400 of chicken-pox, 13 of rubella, and 4 of cow-pox. *Influenza* caused 136 admissions and 1 death, 35 cases occurring at the Curragh, 15 at Aldershot, 11 at Shorncliffe, 10 at Woking, and the remainder at various stations. In 1896 there were 38 cases, with no death. 164 admissions and 17 deaths are recorded for *diphtheria*. In the previous year there were 116 cases with 19 deaths. 96 of the cases with 5 deaths occurred at Aldershot. These cases almost all occurred in the Stanhope lines, the outbreak commencing among the families living in Thornhill Terrace, where the drainage was found to be defective. A series of cases at Devonport, attributed to defective drainage in the Raglan Barracks, were very successfully treated by antitoxin, no death occurring out of 10 admissions, although all were of a more or less grave character. *Enteric fever* caused 13 admissions and one death, as compared with 18 admissions and 3 deaths in the preceding year. Five cases occurred at Norwich, 2 in the Cavalry barracks and 3 in the Britannia Barracks. These cases were associated with defective drainage in the Cavalry barracks, but at the same time it is also noted that enteric fever is endemic in the city, where the drainage and sewage disposal systems are considered defective. Four cases occurred at Maidstone during the period of the great epidemic amongst the civil population there in September and October, all the cases being among children living out of barracks. There were 4 cases in Dublin, the origin of which was not ascertained, although, in connection with one of the cases, the eating of shell fish collected on the seashore was mentioned as a probable cause. The one fatal case occurred in London. *Other continued fevers* gave 145 admissions, equal to 6·7 per 1,000, which is below the corresponding rate for the previous year by ·7. All were of the simple continued fever type. *Dysentery* caused 5 admissions and 2 deaths, as compared with 12 and no death in 1896. Under the head of *malarial fevers*, 57 cases are recorded, equal to 2·6 per 1,000,

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which is practically the same as the corresponding rate in the preceding year. Three of the cases were remittent fever and the remainder ague. *Septic diseases* comprised 10 cases of erysipelas, and 3 of pyæmia of which two were fatal. *Tubercular diseases* caused 67 admissions and 23 deaths, being in the ratios of 3·1 and 1·06 per 1,000 respectively, as compared with 1·8 and ·68, the corresponding ratios in the preceding year. 16 of the cases and 2 of the deaths were due to tubercle of the lungs, and the remainder to other tubercular affections. Under the head of *venereal diseases* there were 16 cases of congenital syphilis, three of which were fatal. In the previous year there were 19 cases and 2 deaths from this cause. *Parasitic diseases* gave an admission rate of 10·6 per 1,000, ringworm being the principal cause of admission. 53 admissions and 1 death are returned on account of *rheumatism.* Eight of the cases of rheumatism are returned as rheumatic fever, one of which was fatal. Under the head of *debility*, 414 admissions and 21 deaths are shown, as compared with 475 and 20 respectively in the preceding year.

Other General Diseases included 587 cases of whooping cough, 196 of mumps, 31 of immaturity at birth, 29 of anæmia, and 26 of rickets. 54 deaths are shown under this head, viz., 28 from immaturity at birth, 23 from whooping cough, and one each from yaws, anæmia, and congenital malformation.

Local Diseases.—Diseases of the Nervous System. The number of admissions was 200, with 58 deaths, the ratios of sickness and mortality being 9·2 and 2·66 per 1,000 respectively, as compared with 8·6 and 2·65 in the previous year. The principal cause of sickness was eclampsia, as many as 100 of the admissions and 33 of the deaths being returned under that head. Of the remaining cases the more important admissions were inflammation of the brain or its membranes 24 cases with 14 deaths, laryngismus stridulus 18 cases with 2 deaths, neuralgia 14 cases, epilepsy 13 cases with 6 deaths, and chorea 10 cases. There was also 1 death from hyperæmia of brain, 1 from hydrocephalus, and one from degeneration of the spinal cord. *Diseases of the eye* caused 191 admissions, principally cases of conjunctivitis. *Diseases of other organs of special sense* gave a sick rate of 4·1 per 1,000, dependent on 89 cases, of which 78 were aural diseases, and 11 affections of the nose. *Diseases of the circulatory system* gave only 13 admissions, of which 6 were cases of valvular disease of the heart. A death is recorded from pericarditis. *Diseases of the respiratory system* caused no less than 3,464 admissions and 123 deaths. The ratio of prevalence of these diseases was 159·2 and that of mortality 5·65 per 1,000, as compared with 142·7 and 4·97 respectively in the previous year. Most of the sickness was caused by bronchial affections, as many as 3,244 cases being returned. The deaths were 88 from bronchitis, 29 from pneumonia, 3 from laryngitis, and one each from phthisis, broncho-pneumonia, and atelectasis. *Diseases of the digestive system* caused 2,145 admissions and 78 deaths, being in the ratios of 98·6 and 3·58 per 1,000 respectively, the former higher by 10·7, and the latter by 1·21 than the corresponding rates in the previous year. The principal causes of sickness were affections of the mouth and throat 843 cases, diarrhœa 660, indigestion 253, and disorders of dentition 209 cases. The causes of death were diarrhœa 43 cases, disorders of dentition 11, enteritis 10, inflammation of stomach 5, peritonitis 4, and vomiting, obstruction of bowel, volvulus, colic, and intussusception one case each. *Diseases of the lymphatic system* caused 123 admissions, all but 15 being cases of inflammation of glands. The sick rate, 5·7 per 1,000, is slightly above the corresponding rate in 1896. *Urinary affections* caused 16 admissions and 2 deaths, as compared with 13 admissions and 2 deaths in 1896. The deaths were one from nephritis, and one from Bright's disease. *Diseases of the generative system* show 13 cases, and *diseases of the organs of locomotion* 44, chiefly cases of inflammation of joint. In the latter section, a death is recorded from ostitis. *Diseases of the connective tissue* gave a sick rate of 7·9 per 1,000, dependent on 125 cases of abscess, with 1 death, 45 of inflammation, and 2 of œdema. *Diseases of the skin* caused 481 admissions, equal to a ratio of 22·1 per 1,000, or 10·7 less than the corresponding rate in the preceding year ; the diseases causing sickness were very varied, eczema and impetigo being the most frequent ailments.

Injuries.—There were [illegible] in number with 6 deaths. In 1896 there were [illegible] injuries with 10 deaths. The principal injuries were wounds 204, contusions 57, burns and scalds 82 and fracture of bones 71. The deaths were 3 from burns and scalds, 2 from suffocation, one caused by overlaying and the other by [illegible] poisoning and one from fracture of base of skull.

Poisons.—Under this head only one admission, namely, for belladonna poisoning, is returned.

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VACCINATION.

In the accompanying table will be found the conditions as to vaccination of all recruits found on inspection fit for the service, during the year, together with the proportion per 1,000 of each condition:—

1897.	Number of Recruits found on Inspection fit for the Service.	Proportion per 1,000
Had marks of vaccination	36,465	969·4
Had marks of small pox	114	3·0
Had neither marks of vaccination nor of small pox	1,037	27·6
Total	37,616	1000·0

As compared with the results in the preceding year an increase of 3·5 per 1,000 is observed among recruits bearing marks of vaccination, a decrease of ·4 among those bearing marks of small-pox, and a decrease of 3·1 among those bearing neither marks of vaccination nor of small-pox.

The following tables, compiled from the annual returns of Principal Medical Officers, show the number of vaccinations performed during the year, with the proportions per 1,000 of successful or modified results or of failures, amongst individuals vaccinated by the arm-to arm method or with preserved lymph.

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Results.	Vaccinated during the Year.						Proportion per 1,000.					
	Arm-to-Arm.		From Preserved Lymph.		Total.		Arm-to-Arm.		From Preserved Lymph.		Total.	
	Primary Vaccination.	Re-Vaccination.	Primary Vaccination.	Re-Vaccination.	Primary Vaccination.	Re-Vaccination	Primary Vaccination.	Re-Vaccination.	Primary Vaccination.	Re-Vaccination.	Primary Vaccination.	Re-Vaccination.
TABLE I.—*Recruits.*												
Perfect vaccine pustules	—	135	381	21,367	381	21,502	—	729·7	802·1	668·2	802·1	668·5
Modified vaccine pustules	—	46	32	7,388	32	7,434	—	248·7	67·4	231·0	67·4	231·1
Failures	—	4	62	3.224	62	3,228	—	21·6	130·5	100·8	130·5	100·4
Total	—	185	475	31.979	475	32,164	—	1000·0	1000·0	1000·0	1000·0	1000·0
TABLE II.—*Soldiers other than Recruits.*												
Perfect vaccine pustules	—	—	3	493	3	493	—	—	1000·0	361·2	1000·0	361·2
Modified vaccine pustules	—	—	—	485	—	485	—	—	—	355·3	—	355 3
Failures	—	—	—	387	—	387	—	—	—	283·5	—	283·5
Total	—	—	3	1, 365	3	1,365	—	—	1000·0	1000·0	1000·0	1000·0
TABLE III.—*Soldiers and Recruits.*												
Perfect vaccine pustules	—	135	384	21,860	384	21,995	—	729·7	803·4	655 6	803·4	656·0
Modified vaccine pustules	—	46	32	7.873	32	7,919	—	248·7	66·9	236·1	66·9	236·2
Failures	—	4	62	3,611	62	3,615	—	21·6	129·7	108·3	129·7	107·8
Total	—	185	478	33,344	478	33,529	—	1000·0	1000·0	1000·0	1000·0	1000·0

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The primary vaccinations and re-vaccinations during the year as shown above, give a total of 34,007 operations amongst all classes of soldiers. This number is greater than the number of vaccinations in the preceding year by 4,342. The number of vaccinations among recruits was 32,639, an increase of 4,763, and the number among soldiers 1,368, a decrease of 424, as compared with the corresponding numbers in the previous year. The number of recruits found on inspection fit for service during the year was 37,616, and as the number vaccinated was 32,639, there are 4,977 not accounted for in the vaccination returns. This is explained by the fact that some recruits, who joined from the militia, had been satisfactorily vaccinated while in that force, while others enlisted so late in the year that the results of their vaccination do not appear in the returns of the year. In some instances, moreover, recruits have deserted before vaccination was carried out.

In the arm-to-arm operations amongst recruits, all of which were re-vaccinations, an increase of 5·3 per 1,000 has taken place in perfect results, and one of 43·6 in modified vaccination, with a decrease of 48·9 in the proportion of failures, as compared with the results in the previous year.

With regard to the primary vaccinations with preserved lymph amongst recruits there is an increase of 119·2 per 1,000 in the proportion of perfect vesicles, a decrease of 72·5 in the proportion of modified results, and a decrease of 46·7 in the proportion of failures. In re-vaccinations an increase of 54·0 per 1,000 has occurred in the proportion of perfect results, a decrease of 16·8 in the proportion of modified vesicles, and one of 37·2 in the proportion of failures.

In the vaccination of soldiers other than recruits there were no arm-to-arm operations. As regards primary vaccinations there were only 3 operations, all successful. A considerable number of re-vaccinations were, however, performed, the results of which show an increase of 11·9 per 1,000 in the proportion of perfect results, an increase of 43·1 in the proportion of modified vesicles, with a decrease of 55·0 in the proportion of failures.

In comparing the results of vaccinations amongst all classes of soldiers, as shown in Table III, with the corresponding results in the previous year, it is found that, as regards primary vaccination there was an increase of 167·8 per 1,000 in the proportion of perfect vesicles, a decrease of 76·4 in the proportion of modified results, and a decrease of 91·4 in the proportion of failures; and as regards re-vaccinations there was an increase of 57·2 per 1,000 in the proportion of perfect results, with a decrease of 15·3 in the proportion of modified results, and of 41·9 in the proportion of failures.

Women.—There were only 12 primary vaccinations amongst women, 11 perfect and one modified. Of 121 cases of re-vaccination 83, or 685·9 per 1,000 gave perfect vaccine vesicles, 29, or 239·7 per 1,000, modified results, and 9, or 74·4 per 1,000 failures. Compared with the previous year there is an increase of 208·4 per 1,000 in the proportion of perfect results, one of 15·0 in the proportion of modified vesicles, and a decrease of 223·4 in the proportion of failures.

Children.—The number of primary vaccinations amongst children was 2,964, of which 13 were arm-to-arm operations, and 2,951 vaccinations with preserved lymph. All the former gave perfect results, while the latter gave perfect results in 2,753 instances or 932·9 per 1,000, the remainder being failures. As compared with the previous year's returns this is an increase of 82·7 in the proportion of perfect vesicles. There were no arm-to-arm re-vaccinations amongst children. The number of re-vaccinations with preserved lymph was 49, of which 38, or 775·5 per 1,000, were successful, an increase of 1·1 as compared with the corresponding ratio in the previous year.

ON THE RECRUITING OF THE ARMY.

It is shown by the Annual Returns of Principal Medical Officers that the number of recruits inspected during the year was 59,986. Of these 22,370 were rejected as unfit, equal to a ratio per 1,000 of 372·92. The remaining 37,616 or 627·08 per 1,000 were found fit for the service. In addition, 575 were rejected within three months of enlistment, making the total number of rejections 22,945, or a ratio of 382·50 per 1,000.

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The subjoined table shows the number inspected, the number rejected, and the ratio of rejections per 1,000 examined :—

TABLE I.

Number of Recruits Inspected.	Number Rejected.			Ratio of Rejections per 1,000 inspected.		
	On Inspection.	Unfit within Three Months of Enlistment.	Total.	On Inspection.	Unfit within Three Months of Enlistment.	Total.
59,986	22,370	575	22,945	372·92	9·58	382·50

It will be observed that of the total number found unfit, 575 men, after having passed at first, were found to have become unfit, or not likely to become efficient soldiers, within three months of enlistment. These recruits were forthwith discharged under the provisions of para. 107 M. (*d.*) Section XIX., Queen's Regulations and Orders for the Army, as all recruits pass through a period of probationary training before being finally accepted.

Compared with the corresponding ratios of the previous year a decrease of 43·00 per 1,000 is seen in the ratio of rejection on inspection, and an increase of 2·02 in that of those rejected after three months. The total ratio of rejection has, therefore, decreased by 40·98, the ratio of men found fit having increased by the same amount.

The native countries of recruits, the ratios of rejection, and the proportion per 1,000 furnished by each country are given in the following table :—

TABLE II.

Native Countries of Recruits.	Number Inspected.	Number Rejected.	Ratio Rejected per 1,000 Inspected.	Proportion per 1,000 Recruits furnished by each Country.
England and Wales ..	45,716	17,956	392·77	762
Scotland	5,779	2,070	358·19	96
Ireland	7,721	2,670	345·81	129
British Colonies and Foreign Countries ..	770	249	323·37	13
Total	59,986	22,945	382·50	1,000

Compared with similar statistics published in the report for the previous year, the ratio of rejection of recruits born in England and Wales has decreased by 40·41, that of recruits born in Scotland by 6·85, that of recruits born in Ireland by 60·33, and that of those born in the Colonies or Foreign Countries by 62·19 per 1,000.

United Kingdom.

Of every 1,000 recruits inspected 762 were natives of England and Wales, 96 were natives of Scotland, 129 were natives of Ireland, and 13 were born in the Colonies or Foreign Countries. These proportions vary but little as compared with the preceding year.

In Table III. are shown the occupations of recruits previous to enlistment, the ratio rejected per 1,000 of each group of occupations, and the proportion of each group in every 1,000 men inspected :—

TABLE III.

Occupations of Recruits.	Number Inspected.	Number Rejected.	Ratio Rejected per 1,000 Inspected.	Proportion of each Group in 1,000 Recruits Inspected.
1. Labourers, Servants, Husbandmen, &c.	38,373	14,927	388·99	640
2. Manufacturing Artisans (Clothworkers, Weavers, Lace Makers, &c.)	8,882	3,723	419·16	148
3. Mechanics employed in Occupations favourable to physical development (Smiths, Carpenters, Masons, &c.) ..	6,110	2,145	351·06	102
4. Shopmen and clerks	4,360	1,702	390·36	73
5. Professional Occupations, Students, &c.	604	203	336·09	10
6. Boys under 17 years of age	1,657	245	147·85	27
Total	59,986	22,945	382·50	1,000

Compared with the previous year there is a decrease of 45·89 per 1,000 in the ratio of rejections of Class I (labourers, etc.), of 42·88 in Class II (manufacturing artisans), of 29·68 in Class III (mechanics, etc.), of 43·36 in Class IV (shopmen and clerks), of 33·21 in Class V (professional occupations), and of 11·14 in Class VI (boys under seventeen years of age).

The proportions of the different classes of occupations, as compared with the preceding year, show a decrease of 22 per 1,000 recruits inspected in the labourer class (Class I), of 3 in Class VI (boys under seventeen years of age), of 2 in Class III (mechanics, etc.), and of one in Class V (professional occupations), but an increase of 28 in the artisan class (Class II), while the proportion of shopmen and clerks (Class VI) remains unchanged.

The following table gives the number of recruits rejected on inspection during the year according to the different causes of rejection arranged in classes, and the ratio per 1,000 of rejection in each class. Similar information is given regarding recruits unfit within three months of enlistment.

TABLE IV.

United Kingdom.

Causes of Rejections in Classes.	Total Inspected, 59,986.			
	Number Rejected on Inspection.	Ratio per 1,000 Rejected on Inspection.	Unfit within Three Months of Enlistment.	Ratio per 1,000 Rejected as Unfit within Three Months of Enlistment.
1. Syphilis	208	3·47	1	·02
2. Tubercle	104	1·73	12	·20
3. Impaired Constitution and Debility	267	4·45	40	·67
4. Other General Diseases	252	4·20	5	·08
5. Diseases of Nervous System	33	·55	51	·85
6. Weakness of Intellect	73	1·22	76	1·27
7. Defective Vision	2,468	41·15	14	·23
8. Diseases of Eyes and Eyelids	84	1·40	3	·05
9. Diseases of Nose and Mouth	36	·60	3	·05
10. Disease of Ears	122	2·03	25	·42
11. Deafness	81	1·35	18	·30
12. Impediment of Speech	66	1·10	5	·08
13. Disease of Heart	1,060	17·67	62	1·04
14. Disease of Arteries (Aneurysm)	5	·08	—	—
15. Disease of Veins (Varix)	925	15·42	20	·33
16. Disease of Lungs (except Tubercle)	48	·80	6	·10
17. Loss or Decay of many Teeth	1,449	24·16	17	·28
18. Hernia	467	7·79	32	·53
19. Laxity of Abdominal Rings	99	1·65	3	·05
20. Hæmorrhoids	79	1·32	1	·02
21. Diseases of the Urinary Organs	17	·28	11	·18
22. Varicocele	784	13·07	18	·30
23. Other Diseases of the Genital Organs (not Syphilitic).	97	1·62	3	·05
24. Defects of Upper Extremities, from Fracture, Contraction, Luxation, &c.	298	4·97	7	·12
25. Defects of Lower Extremities, from Fracture, Contraction, Luxation, &c.	1,087	18·12	32	·53
26 Flat Feet	1,007	16·79	33	·55
27. Diseases of Joints	111	1·85	19	·32
28. Other Affections of Bones and Muscles.	142	2·37	15	·25
29. Ulcers, Wounds, and Cicatrices	103	1·70	14	·23
30. Other Affections of the Cutaneous System.	179	2·98	3	·05
31. Malformation of Ears	5	·08	—	—
32. Malformation of Nose and Mouth	6	·10	—	—
33. Malformation of Chest and Spine	384	6·40	7	·12
34. Malformation of Urinary or Genital Organs.	17	·28	4	·07
35. Under Height	1,491	24·86	2	·03
36. Under Chest Measurement	5,365	89·44	8	·13
37. Under Weight	2,734	45·58	2	·03
38. Apparent Age not in accordance with Regulations.	329	5·49	1	·02
39. Not likely to become efficient	250	4·17	2	·03
40. Over Height	38	·63	—	—
Total rejected	22,370	372·92	575	9·58

United Kingdom.

The largest number of rejections on inspection is caused by defective development (under height, weight, and chest measurement), the ratio of rejection under the headings 35, 36 and 37 being 159·88 per 1.000. This is, however, a decrease of 14·18 as compared with the corresponding ratio for the previous year.

The highest ratio of rejection was on account of deficient chest measurement, namely, 89·44 per 1,000, but this is lower than the similar rate in the previous year by 50·20. The ratio of rejection for deficient weight, 45·58 per 1,000, has increased by 9·63, while the ratio of rejection for being under height, 24·86 per 1,000, has decreased by 3·91, as compared with the corresponding rates for the preceding year.

Among other causes of rejection, defective vision was the most frequent, the ratio being 41·15 per 1,000, which is higher by ·43 than in 1896. The next most frequent causes of rejection were loss or decay of many teeth, 24·16 per 1,000; defects of lower extremities, 18·12 per 1,000; disease of heart, 17·67 per 1,000; flat-feet, 16·79 per 1,000; disease of veins, 15·42 per 1,000; and varicocele 13·07 per 1,000. In the previous year these conditions were, generally speaking, the more frequent causes of rejection, but the order of their frequency and the ratios themselves vary.

Among the recruits found unfit within three months after enlistment, the highest numbers of rejections were on account of weakness of intellect (76), disease of heart (62), diseases of the nervous system (51), impaired constitution (40), and flat feet (33).

Ages, Heights, Weights, and Chest Measurements of all Recruits finally approved for Service during the Year

In the following table are shown the ages of all recruits finally approved for service, and the proportion of each age per 10,000 :--

TABLE V.

Ages.	Numbers finally approved for Service.	Proportion per 10,000.
Boys under 17 years	1,416	382
From 17 to 18 „	468	126
„ 18 to 19 „	17,074	4,609
„ 19 to 20 „	7,633	2,061
„ 20 to 21 „	3,614	976
„ 21 to 22 „	2,571	694
„ 22 to 23 „	1,780	481
„ 23 to 24 „	1,286	347
„ 24 to 25 „	967	261
25 years and upwards	232	63
Total	37,041	10,000

The greatest number of recruits, it will be seen, are passed fit for service between 18 and 19 years of age, the number at that age constituting nearly half of the total. In the preceding year the proportion was 4.265 for every

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10,000. Of the ages between 19 and 20 years, and 20 to 21 years, the proportions, 2,061 and 976 in every 10,000 approved, resemble very closely the corresponding proportions in 1896, namely, 2,144 and 1,015 respectively.

The next table gives the heights of recruits finally approved, and the proportion of each height per 10,000. It also gives the heights of recruits finally approved, arranged in series according to age, together with the proportion per 10,000 of each height at each age.

TABLE VI.

Heights of Recruits finally approved for Service.	Boys under 17 years.	Between 17 and 18.	Between 18 and 19.	Between 19 and 20.	Between 20 and 21.	Between 21 and 22.	Between 22 and 23.	Between 23 and 24.	Between 24 and 25.	25 years and upwards.	Total at each Height.
ft. in. ft. in. Under 5 3 ...	1,185	3	31	17	8	1	1	2	—	2	1,250
5 3 to 5 4 ...	91	91	2,386	806	236	151	94	45	34	10	3,944
5 4 to 5 5 ...	55	105	3,910	1,299	579	401	232	137	103	26	6,847
5 5 to 5 6 ...	42	116	3,863	1,477	613	488	312	204	185	33	7,333
5 6 to 5 7 ...	23	66	2,631	1,281	570	425	325	239	172	33	5,765
5 7 to 5 8 ...	11	47	1,880	1,143	521	383	274	245	167	49	4,720
5 8 to 5 9 ...	6	18	1,115	717	441	301	211	177	125	31	3,142
5 9 to 5 10 ...	3	13	695	457	314	196	164	120	88	18	2,068
5 10 to 5 11 ...	—	6	271	228	152	123	81	59	43	18	981
5 11 to 6 0 ...	—	1	181	133	103	60	46	39	28	8	599
6 0 and upwards	—	2	111	75	77	42	40	19	22	4	392
Totals at each age	1,416	468	17,074	7,633	3,614	2,571	1,780	1,286	967	232	37,041

Heights of Recruits finally approved for Service.	Proportions per 10,000 at each Age.										Total Proportion of each Height per 10,000.
	Boys under 17 years.	Between 17 and 18.	Between 18 and 19.	Between 19 and 20.	Between 20 and 21.	Between 21 and 22.	Between 22 and 23.	Between 23 and 24.	Between 24 and 25.	25 Years and upwards.	
ft. in. ft. in. Under 5 3 ...	8,369	64	18	22	22	4	6	16	—	86	337
5 3 to 5 4 ...	643	1,944	1,397	1,056	653	587	528	350	352	431	1,065
5 4 to 5 5 ...	388	2,244	2,290	1,702	1,602	1,560	1,303	1,065	1,065	1,121	1,849
5 5 to 5 6 ...	297	2,479	2,263	1,935	1,696	1,898	1,753	1,587	1,913	1,422	1,980
5 6 to 5 7 ...	162	1,410	1,541	1,678	1,577	1,653	1,826	1,858	1,779	1,422	1,556
5 7 to 5 8 ...	78	1,004	1,101	1,498	1,442	1,490	1,539	1,905	1,727	2,112	1,274
5 8 to 5 9 ...	42	385	653	939	1,220	1,171	1,185	1,376	1,293	1,336	848
5 9 to 5 10 ...	21	278	407	599	869	762	921	933	910	776	558
5 10 to 5 11 ...	—	128	159	299	421	479	455	459	445	776	265
5 11 to 6 0 ...	—	21	106	174	285	233	259	303	289	345	162
6 0 and upwards ...	—	43	65	98	213	163	225	148	227	173	106
Total ...	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

United Kingdom.

Compared with a similar return for the previous year the proportion of recruits under 5 feet 3 inches in height per 10,000 approved has decreased by 58, between 5 feet 4 inches and 5 feet 5 inches by 169, between 5 feet 5 inches and 5 feet 6 inches by 183, between 5 feet 7 inches and 5 feet 8 inches by 17, between 5 feet 8 inches and 5 feet 9 inches by 55, between 5 feet 9 inches and 5 feet 10 inches by 31, and between 5 feet 10 inches and 5 feet 11 inches by 21 ; while the proportion of recruits between 5 feet 3 inches and 5 feet 4 inches in height has increased by 447, between 5 feet 6 inches and 5 feet 7 inches by 68, between 5 feet 11 inches and 6 feet by 8, and over 6 feet by 11.

Omitting boys under 17 years of age the highest proportion of recruits approved was between 17 and 18 years of age and between 5 feet 5 inches and 5 feet 6 inches in height, namely 2,479 per 10,000. The next highest proportion was 2,290 per 10,000 among recruits between 18 and 19 years of age and between 5 feet 4 inches and 5 feet 5 inches in height. In the preceding year the relative position of these two proportions was reversed. With regard to recruits between 18 and 19 years of age, at which age the great majority of the recruits is obtained, 2,290 per 10,000 were between 5 feet 4 inches and 5 feet 5 inches in height, and 2,263 per 10,000 between 5 feet 5 inches and 5 feet 6 inches. This shows a considerable decline as compared with the preceding year, when the proportions were 2,612 per 10,000 between 5 feet 5 inches and 5 feet 6 inches in height, and 2,575 per 10,000 between 5 feet 4 inches and 5 feet 5 inches.

The next table shows the weights of the recruits who were finally approved, and the proportion of each weight per 10,000. It also shows the weights of these recruits arranged in series according to age, together with the proportion per 10,000 of each weight at each age :—

TABLE VII.

Weights of Recruits finally approved for Service.	Boys under 17 Years.	Between 17 and 18.	Between 18 and 19.	Between 19 and 20.	Between 20 and 21.	Between 21 and 22.	Between 22 and 23.	Between 23 and 24.	Between 24 and 25.	25 Years and upwards.	Total at each Weight.
Under 100 lbs. ...	1,128	1	1	—	—	—	—	—	—	—	1,130
100—110 lbs. ...	198	20	49	9	2	3	—	1	1	—	283
110—120 „ ...	62	182	6,154	1,600	438	267	147	99	38	11	8,998
120—130 „ ..	20	169	6,443	2,692	1,015	733	435	277	209	35	12,028
130—140 „ ...	8	67	3,048	2,180	1,109	761	557	377	275	71	8,453
140—150 „ ...	—	22	1,030	779	668	490	357	296	222	64	3,928
150—160 „ ...	—	5	272	280	250	208	182	145	134	32	1,538
160—170 „ ...	—	2	70	80	79	91	82	67	61	13	545
Upwards of 170 lbs.	—	—	7	13	23	18	20	24	27	6	133
Totals at each age	1,416	468	17,074	7,633	3,614	2,571	1,780	1,286	967	232	37,041

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(continued)

Weights of Recruits finally approved for Service.	Proportions per 10,000 at each Age.										Total Proportion of each Weight per 10,000.
	Boys under 17 Years.	Between 17 and 18.	Between 18 and 19.	Between 19 and 20.	Between 20 and 21.	Between 21 and 22.	Between 22 and 23.	Between 23 and 24.	Between 24 and 25.	25 Years and upwards.	
Under 100 lbs. ...	7,966	21	1	—	—	—	—	—	—	—	305
100—110 lbs. ...	1,398	427	29	12	5	12	—	8	10	—	77
110—120 ,, ...	438	3,889	3,604	2,096	1,212	1,038	826	770	393	474	2,429
120—130 ,, ...	141	3,611	3,773	3,527	2,808	2,851	2,444	2,154	2,161	1,509	3,247
130—140 ,, ...	57	1,432	1,785	2,856	3,069	2,960	3,129	2,931	2,844	3,060	2,282
140—150 ,, ...	—	470	603	1,020	1,848	1,906	2,006	2,302	2,296	2,759	1,061
150—160 ,, ...	—	107	159	367	775	809	1,022	1,127	1,386	1,379	415
160—170 ,, ...	—	43	41	105	219	354	461	521	631	560	147
Upwards of 170 lbs.	—	—	5	17	64	70	112	187	279	259	37
Totals at each age	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Compared with the corresponding return in the previous year a decrease of 51 per 10,000 has occurred in the proportion of recruits under 100 lbs. in weight, of 565 in that of recruits between 130 and 140 lbs., of 122 between 140 and 150 lbs., of 37 between 150 and 160 lbs., of 16 between 160 and 170 lbs., and of 5 in the proportion of recruits over 170 lbs. in weight. The proportion of recruits per 10,000 between 100 and 110 lbs. in weight has increased by 2, of recruits between 110 and 120 lbs. by 586, and between 120 and 130 lbs. by 208.

Omitting boys, the highest proportion of recruits approved was between 17 and 18 years of age and between 110 and 120 lbs. in weight, namely 3,889 per 10,000. The next highest number was 3,773 per 10,000 among recruits between 18 and 19 years of age and between 120 and 130 lbs. in weight. In the preceding year the relative position of these two proportions was reversed.

In the next table are shown the chest measurements of recruits finally approved and the proportion of each measurement per 10,000. The table also shows the chest measurements arranged in series according to age, together with the proportion per 10,000 of each chest measurement at each age.

TABLE VIII.

Chest measurement of Recruits finally approved for Service.	Boys under 17 Years.	Between 17 and 18.	Between 18 and 19.	Between 19 and 20.	Between 20 and 21.	Between 21 and 22.	Between 22 and 23.	Between 23 and 24.	Between 24 and 25.	25 Years and upwards.	Total at each Chest Measurement.
Under 31 inches ...	1,205	4	5	3	—	—	—	—	—	—	1,217
31—32 inches ...	135	61	261	53	11	6	1	3	2	1	534
32—33 ,, ...	52	168	3,637	1,016	253	132	74	40	31	6	5,439
33—34 ,, ...	17	137	6,439	2,457	861	546	339	197	114	30	11,137
34—35 ,, ...	6	64	4,510	2,461	1,304	930	627	406	299	57	10,664
35—36 ,, ..	—	33	1,622	1,126	775	587	433	358	294	76	5,304
36—37 ,, ...	1	1	430	352	258	225	189	167	122	31	1,776
37—38 ,, ...	—	—	137	103	111	101	87	77	67	21	704
Above 38 inches ..	—	—	33	32	41	44	30	38	38	10	266
Totals at each age	1,416	468	17,074	7,633	3,614	2,571	1,780	1,286	967	232	37,041

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(*continued*)

Chest measurement Recruits finally approved for Service.	Proportions per 10,000 at each Age.										Total proportion of each Chest Measurement per 10,000.
	Boys under 17 Years.	Between 17 and 18.	Between 18 and 19.	Between 19 and 20.	Between 20 and 21.	Between 21 and 22.	Between 22 and 23.	Between 23 and 24.	Between 24 and 25.	25 Years and upwards.	
Under 31 inches ...	8,510	86	3	4	—	—	—	—	—	—	329
31—32 inches ...	953	1,303	153	70	31	23	6	23	21	43	144
32—33 „ ...	367	3,590	2,130	1,370	700	514	416	311	320	259	1,468
33—34 „ ...	120	2,927	3,771	3,219	2,382	2,124	1,904	1,532	1,179	1,293	3,007
34—35 „ ...	43	1,368	2,642	3 224	3,608	3,617	3,522	3,157	3,092	2,457	2 879
35—36 „ ...	—	705	950	1,475	2,145	2,283	2,433	2,784	3,040	3,276	1,432
36—37 „ ...	7	21	252	461	714	875	1,062	1,299	1,262	1,336	479
37—38 „ ...	—	—	80	135	307	393	489	599	693	905	190
Above 38 inches ...	—	—	19	42	113	171	168	295	393	431	72
Total	10.000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Compared with the return for the preceding year a decrease of 58 per 10,000 has occurred in the proportion of recruits under 31 inches chest measurement, of 324 in that of recruits between 33 and 34 inches chest measurement, and of 390 between 34 and 35 inches chest measurement. The proportion of recruits between 31 and 32 inches chest measurement has increased by 66, of those between 32 and 33 inches by 675, and of those over 35 inches chest measurement by 31.

Omitting boys, the highest proportion of recruits at any age and of any chest measurement was 3,771 among recruits between 18 and 19 years of age and between 33 and 34 inches chest measurement, as compared with 4,443 at the same age and chest measurement in the previous year.

Excluding boys under 17 years of age the following general results are obtained. The average age of recruits finally approved during the year was 19·2 years as compared with 19·3 in 1896; the average height was 5 feet 5⅘ inches, practically the same as in the preceding year; the average weight 124·1 lbs. as compared with 125·8 lbs. in the previous year, and the average chest measurement 33·7 inches.*

The next table shows the state of education of recruits finally approved, together with the proportion per 1,000 of those well educated, able to read and write, able to read only, or unable to read.

TABLE IX.

—	Numbers finally approved.	Proportion per 1,000.
Well educated	1,699	46
Able to read and write..	34,174	923
Able to read only	539	14
Unable to read	629	17
Total	37,041	1,000

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* This year the record of chest measurements of recruits has been extended to 38 inches, in order to arrive at a more accurate average. If the statistics now under review had been calculated as heretofore, that is, including under one group all chest measurements above 35 inches, the average would have been 38·5.

Compared with the corresponding table for the preceding year a decrease of 23 per 1,000 has taken place in the proportion of recruits returned as well educated, and of 4 in that of recruits unable to read, while there is an increase of 24 in the proportion of recruits able to read and write, and of 3 in that of recruits able to read only. *United Kingdom.*

SANITARY CONDITIONS, UNITED KINGDOM, 1897.

North-Eastern District.

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The Principal Medical Officer (Surgeon-Colonel W. D. Wilson, M.B) reports that the general health of the troops in the district has been good during the year; but he specially notes the large number of admissions for diseases of the digestive and respiratory systems, and considers that in some cases more coal is required for heating the men's rooms. He also notes, as in 1896, that the smaller stations are much better provided with means of ablution than the stations occupied by the mounted troops, which, he states, have the worst ablutionary arrangements. Improvements are, however, being effected. Venereal disease has been slowly but steadily decreasing in the district during the past three years, but is still very prevalent at Leeds, Newcastle, and Sheffield, the chief decrease being in York, although several stations, notably Pontefract with an average strength of 310, have practically little or no sickness from this cause. Infectious diseases were more or less prevalent throughout the civil populations of the district, but there was a very small incidence of such diseases amongst the troops and families in garrison, Leicester, Pontefract, and Richmond being the only stations where any definite outbreak of scarlet fever or measles occurred. Reference is specially made to the insufficiency of the mutton ration, when the supply is frozen mutton.

During the year Scarborough and Tynemouth have been used as convalescent depôts. Two classes of convalescents are transferred to these depôts, namely, men who require no hospital treatment but who have not regained strength sufficiently to return to duty, and men who require change of air in aid of hospital treatment. For the former barrack room accommodation is provided, but only one man was transferred under this class during the year. Twenty-four of the latter class were transferred, viz., 22 to Scarborough (19 from York and 3 from Leeds) and 2 to Tynemouth, both from Newcastle. The Principal Medical Officer remarks that almost all the patients have derived great benefit and the expense has been small. The following notes are compiled from the sanitary reports of the various stations in the district.

Beverley.—The old drainage was very faulty, and a new system of drainage is being constructed throughout the barracks.

Bradford.—The same conditions noted in the report for 1896 are again referred to, namely, the difficulty of keeping the rooms warmed, in consequence of the exposed nature of the situation, and the old and unsuitable construction of the hospital building and annexes.

Derby.—Nothing of importance is noted.

Halifax.—Throat affections are noted as having been numerous and severe, and probably induced by sudden changes of temperature. In a strength of 151 there was practically no venereal disease. A gymnasium is in course of construction.

Leeds.—Venereal disease accounted for an admission rate of 45·9 per cent. of strength, in a garrison of 324. This excessive prevalence of disease was also observed in the previous year. Nothing of note has been reported regarding the sanitary condition of barracks, &c., but a statement is made to the effect that 16 suitable quarters for families have been leased in Rae Street.

Leicester.—There was considerable prevalence of measles amongst the children, contracted in the neighbourhood. The surface drainage has been much improved. The means of warming are considered insufficient, and the absence of a fireplace in the bed rooms of the married quarters is much felt.

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Lincoln.—The water supply is of suspicious quality, but is carefully filtered and no disease has been attributed to it. Scarlet fever was prevalent in the town, but the children of the garrison escaped. Cases of ague, of local origin, are noted as occurring from time to time.

Newcastle-on-Tyne.—Everything was generally in a satisfactory condition.

Pontefract.—In 1896 a marked increase in venereal disease was noted. This year the admissions are only 4·5 per cent. in an average strength of 310, and all these are attributed to contagion elsewhere. Scarlet fever and measles were prevalent in the town, and the latter disease affected the children in garrison. Scarlet fever also occurred in the garrison, but at a time when it had ceased to exist amongst the civil population. The disease was imported from Aldershot on August 8th, and ten cases followed in rapid succession, the outbreak ceasing on August 22nd. Town water has been laid on during the year for all purposes, and the use of the old well water has been entirely abandoned. The drill shed has been closed in to form a modified gymnasium The drainage is considered unsatisfactory, the surface drainage being described as "very bad," while several defects in the construction of the foul drains have been brought to light. A section of the latter has been reconstructed and a new water closet and urinal provided in the hospital yard. Concrete platforms have been constructed for the urine tubs.

Richmond.—A measles epidemic, commencing at the end of 1896, continued in the early part of the year amongst the children; but, otherwise, the sanitary conditions are generally noted as satisfactory.

Scarborough.—Some defects in the drainage were detected and remedied, notably defects causing pollution of a rain-water tank, opposite the women's wash-house, with sewage. A new mortuary and foul linen store was provided for the station hospital. The use of the hospital for convalescent patients from other stations met with a considerable amount of success, but, it is noted, that there is no ground attached to the hospital for convalescent exercise. A suggestion is made to provide this by the transfer of an iron building close to the hospital, used as a militia officers' mess, to another site.

At *Sheffield*, in contrast with 1896, there was a marked absence of zymotic disease amongst the troops, two cases of measles and two of scarlet fever amongst the children being practically the only admissions recorded. Venereal disease was, however, as previously, very prevalent, accounting for 26·7 admissions per cent. of strength. Several sanitary improvements were effected during the year, the principal being the concreting, draining and enlargement of canteen urinal, reconstruction of a portion of the drainage of the officers' quarters, and laying on of hot water to the several landings of the hospital. The chief requirements noted are an increase in the accommodation for married families and concreting of the floors of latrines and urinals. The lighting of the hospital wards is stated to be inadequate.

Strensall Camp.—All sanitary conditions are reported to have been satisfactory.

Tynemouth Castle.—Nothing of sanitary importance is noted.

York.—The chief defects are noted in the cavalry barracks, where many of the married quarters are old and without sculleries or internal water supply, and several consist of one room only. The infantry barracks are in every respect favourably reported upon. The hot water supply of the hospital is considered unsatisfactory. A great convenience during the year has been the provision of a foul linen store near the laundry. The latter is reported to be too small and badly constructed.

North-Western District.

The Principal Medical Officer (Surgeon-Colonel F. B. Scott, M.D., C.M.G.) reports that the health of the troops as compared with the previous year, shows an improvement, the admission, constantly sick and death rates all

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showing a decrease. There were only two cases of enteric fever in the district, one, a man living out of barracks, and the other, supposed to have been contracted in Liverpool. Measles was the only zymotic disease showing any extensive prevalence. Venereal diseases accounted for high admission rates at Preston and Manchester, 26·5 and 24·2 per cent. of strength respectively, but at all other stations the admission rates for these diseases was comparatively low.

At *Altcar Camp* the sanitary condition and health of the troops were satisfactory. There was very little sickness and the weather was good except latterly.

At *Ashton-under-Lyne* measles was epidemic in the vicinity and the children in barracks were affected, the schools having to be closed. The health of the troops was extremely good, and the sanitary works, referred to in last year's report, have effected a great improvement. During 1897 all the rainwater pipes were disconnected from the drains and the ventilation of the guard room was improved.

At *Birmingham* the barracks were vacated throughout the year, and with the exception of a few of the recruiting staff, no troops were present. The hospital was dismantled in September, and any cases of sickness that occur are sent to Lichfield.

At *Burnley* the general sanitary conditions were satisfactory. The ventilation in the old barracks and canteen is said to be bad, and the hospital surgery is reported to be small and badly lighted. Some defects were discovered in the hospital drains, but they were at once remedied. The rain-water pipes were disconnected from the drains, and alterations were made in the water mains so as to secure an ample supply of water at places where the supply was previously deficient.

At *Bury* the enlargement of the canteen tap room is still under consideration. Otherwise the sanitary conditions are satisfactory, and the health of the troops was good. The rain-water pipes were disconnected from the drains and the coffee bar enlarged, in addition to other minor improvements.

At *Birscough* a hospital ward of three beds, with surgery and orderlies' room have been provided, and rain-water pipes have been disconnected as above.

At *Carlisle* the health of the troops was very satisfactory. No sanitary defects are noted. The rain-water pipes have been disconnected and concrete platforms provided for urine tubs.

At *Chester* the health of the troops has been very good during the year, there being no admission for zymotic disease. The water supply, from the River Dee, although, as noted last year, liable to pollution by sewage discharged into it at points above the intake, was found wholesome on chemical and bacteriological examination, and the means of purifying it by filtration, as adopted by the Water Company, are considered efficient. The condition of the hospital is not considered satisfactory, the nature of the defects having been detailed in last year's report, and the construction of a new hospital has been recommended. During the year all the soil pipes were ventilated, the rain-water pipes disconnected, and other minor sanitary improvements effected.

At *Chipping Camp* some minor improvements in the drainage were carried out.

At *Coventry* three cases of scarlet fever occurred among the troops and were admitted into the City Infectious Hospital. They all occurred about the same time and were probably contracted in the town. No sanitary defects or improvements were noted during the year.

At *Fleetwood* the health of the troops was very good, and the medical officer in charge regards it as one of the healthiest stations in England, and suitable for the transfer of cases from other stations, requiring change of air. An isolation ward for the hospital and a more modern flushing apparatus to the hospital waterclosets continue to be noted as the chief requirements at the station. The drainage was thoroughly overhauled during the year and is satisfactory, while the water supply has been improved by additional filtration being carried out by the Fylde Water Company. The rain-water pipes were disconnected and other minor sanitary improvements effected.

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At *Lancaster* the health of the troops was again remarkably good, and, with the exception of an epidemic of measles amongst the children, no zymotic disease was prevalent. Measles was epidemic among the civil population. The medical officer in charge continues to report the unsatisfactory condition of the married quarters, on account of there being no means of warming the bedrooms during the winter. Fourteen quarters (cottages) have been rented outside barracks for married soldiers. The wash-house of the married quarters is noted as requiring enlargement. The rain-water pipes were disconnected during the year and a few minor sanitary improvements were carried out.

At *Lichfield* the health of the troops was very satisfactory, and there has been no zymotic disease. A severe type of venereal disease is stated to have been brought into the station by a detachment of the Royal Lancaster Regiment from Devonport. The detachment arrived on the 1st July, and, out of an average annual strength of 92, gave 16 admissions for venereal disease before the end of the year, or more than double the proportion of admissions for these diseases amongst other corps at the station. The barracks are in good sanitary condition. Several minor sanitary improvements were effected during the year.

At *Seaforth* there was one case of enteric fever amongst the troops, and five of scarlet fever, one of measles and one of diphtheria amongst the children, otherwise the health of the troops was very satisfactory. Infectious diseases amongst the troops are sent to the Civil Infectious Hospital. An additional bath was provided for recruits. The rain-water pipes were disconnected from the drains and the soil pipes ventilated during the year. Amongst the requirements noted by the medical officer in charge are hospital accommodation for women and children and more satisfactory accommodation for examination of recruits.

At *Hulme* (Manchester) there were no cases of zymotic disease, with the exception of two cases of mumps amongst the men. The drainage and barracks generally are reported to be of old construction, but the health of the troops was good. Although the men are stationed in one of the worst slums of Manchester, it is noted that there were no admissions directly or indirectly due to intemperance. The medical officer in charge notes defects in the supply of hot water to the bath on the top floor of the hospital. The rainwater pipes were disconnected during the year and a few other minor sanitary improvements effected, including the demolition of the old hospital bedding store.

At *Preston* measles was again epidemic amongst the children and there were also two cases amongst the men. The disease was not prevalent in the town to any great extent when it first appeared in barracks, but later on a severe and virulent epidemic prevailed in Preston and its suburbs. The first case in barracks occurred in April and is said to have been imported from Fleetwood. The epidemic lasted till June. The water supply is reported to be contaminated with vegetable matter but is otherwise satisfactory. The latrines, which are on the dry earth system, are old and did not work satisfactorily during the year. The canteen tap room is reported to be badly ventilated, and the hospital is considered defective in many respects, the entire arrangement being described as obsolete. One of the largest wards is so badly lighted that it is said to be useless, hot water is laid on to one bath only, the night latrine soil has to be carried through the hospital before it can be removed, and the floors and internal facings of the walls are old and uneven. Several minor sanitary improvements were effected during the year, and a damp piece of ground adjoining the new married quarters drained.

At *Shrewsbury* the health was good. The town water supply, from the river Severn, is said to be liable to pollution, but the barrack supply is from a well in barracks, and reported to be good. A number of pigs were kept outside barracks in the vicinity of the well, and, on representations being made, they were removed. The drill shed was closed in to form a modified gymnasium, and a few minor improvements were effected.

At *Warrington* the medical officer in charge again draws attention to the great prevalence of sore throats amongst the men during the winter months, and he states that this is probably due to the fact that a large number of men are recruited from ironworks, &c., where they are exposed to great heat, and

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hence are more susceptible to cold. Two cases of scarlet fever occurred among the men during the year, but the disease was not epidemic in the vicinity. Several improvements were effected during the year in the drainage, including the relaying of one portion, the diversion of another from under a room, the disconnection of the rain-water pipes, and the provision of water-closets to the office block. Several minor improvements were also carried out.

At *Warwick* there was an epidemic of measles during the autumn months amongst the children. The disease was supposed to have been introduced from Birmingham. There were cases of scarlet fever amongst the militia, also said to have been contracted in Birmingham, where the disease was epidemic. The drill shed was closed in during the year and sanitary improvements effected in the drainage system.

At *Worcester* the health of the troops was very satisfactory, there being an entire absence of zymotic disease. The water supply is reported to be only "fairly good." It is from the river Severn, and liable to pollution. The drill shed was closed in and some sanitary improvements effected in the drainage system during the year.

At *Wrexham* scarlet fever and diphtheria were prevalent in the town, and two cases of the former and two of the latter disease occurred among the children; they were treated in the Civil Infectious Hospital. The fall of the drains has been improved, and the system connected with the town system. Fireplaces have been added to some of the bedrooms in the married quarters and a slop sink provided outside the women's latrine. The soil pipes have been ventilated and some other minor improvements effected.

Eastern District.

The Principal Medical Officer (Surgeon-Colonel J. Maturin) reports that the health of the troops was good and compared favourably with previous years. Scarlet fever was much less prevalent than in 1896, Warley being again the station where most cases occurred. Measles was prevalent in Colchester only, and enteric fever again showed a certain amount of prevalence at Norwich, but chiefly amongst the women and children. No case of enteric fever was contracted at any other station in the district. Influenza is stated to have been very prevalent among the civil population throughout the district, and of 70 admissions amongst the troops, exclusive of sickness amongst officers, women and children, 52 occurred at Northampton alone. Diphtheria accounted for six admissions amongst the men, all at Colchester. There was no case amongst the children. Venereal diseases were most prevalent at Colchester, Warley, Norwich, Ipswich, and Bedford, whereas at Landguard Fort and Northampton the venereal admission rate was very small.

At *Bedford* the town council is said still to have the question of providing a disinfecting apparatus under consideration. A receiving room has been provided for recruits, the drill shed converted into a gymnasium, and the ventilation of drains improved.

At *Bury St. Edmunds* the sanitary conditions generally are reported satisfactory and no defects or improvements were noted during the year.

At *Colchester* further improvements took place during the year in the barrack accommodation, and the barracks for the Medical Staff Corps have been completed and occupied. A steam disinfecting apparatus has been provided at the hospital, and general improvements have been effected in the drainage of the barracks. Defects are still noted in some of the surface drains, and in the ablution and latrine arrangements of the old hut encampment.

At *Harwich* everything is reported to be in a satisfactory sanitary condition.

At *Ipswich* the old earth closets are still noted as unsatisfactory. Otherwise the sanitary conditions are reported to be good, and no defects or improvements are specially reported upon.

At *Landguard Fort* the sanitary conditions are not altogether satisfactory. The sewerage system is said to require improvement, and steps were being taken to have it completely reconstructed in 1898. Many of the married quarters have one room only, and the families are in the habit of emptying slops into a rain-water tank, as there is no proper receptacle for the purpose.

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The construction of a new dieted hospital has been sanctioned; the defects in the existing non-dieted hospital have been detailed in the report for 1896. There is a dual water supply, drinking water being obtained from a well and pumped up into storage tanks in the fort, while the ablution water is rain-water collected on clean surfaces.

At *Northampton* no sanitary defects are noted, nor were any improvements required during the year.

At *Norwich* there was an outbreak of enteric fever among the families and one case amongst the men. Three of four cases amongst the children occurred in the Britannia barracks, which are comparatively new and in good sanitary condition, but a well in these barracks was found polluted and had to be closed. Of the other cases, one man, one woman, and one child were living in the cavalry barracks, and one woman was on the lodging list. The drainage in the cavalry barracks was found very defective and has since been greatly improved. Improvements have also been effected in the drains of the Britannia barracks. Enteric fever was prevalent also amongst the civil population.

At *Warley* the provision of a disinfecting apparatus is still urged Accommodation for the men of the Medical Staff Corps has been provided by the re-appropriation of two rooms on the ground floor of the hospital building, and the infectious diseases hospital accommodation has been increased by the re-appropriation of two officers' quarters in the vicinity of the hospital. Dining and reading rooms for the patients and other improvements at the hospital have also been obtained by re-appropriation. No sanitary defects are noted in the barracks generally.

At *Weedon* the water supply is on a dual system, the drinking water being from a well in the barracks and the ablution water from the town waterworks, which draw the supply from "Weedon Brook." The well is considered to be good and free from pollution, and was cleaned during the year. The latrines are on the dry earth system except at the hospital, officers' mess, and married quarters, where there are water-closets. Amongst defects still noted, are the want of an isolation ward at the hospital, the bad lighting and ventilation of the artillery barracks, and the inadequacy of the hot water apparatus at the station hospital. The surface drainage was improved during the year.

At *Great Yarmouth* it is noted that the arrangements made during the previous year to isolate infectious diseases amongst the families, in the civil isolation hospital, has been of much value in checking the spread of scarlet fever, but the custom of sending the children to civil schools is considered objectionable on account of their liability to contract infectious disease from the poorer classes of the civil population. No sickness has been traced to defects in the water supply, noted in 1896. The latrine accommodation of some of the married quarters is considered insufficient and the night urinals in barracks antiquated. The medical officer in charge notes that the hospital accommodation is in excess of requirements, and might advantageously be utilized during the summer season for convalescent patients from inland stations. "The hospital is splendidly situated for the purpose and commands an uninterrupted view of the sea." The addition of storm windows would mitigate the discomfort from cold in winter. Coir mattresses were taken into use in place of straw throughout the district during the year.

Western District.

The Principal Medical Officer, Surgeon-Major-General J. B. Hamilton, M D., reports that the health of the troops in the district was, generally speaking, satisfactory. In January the "Nubia" arrived at Devonport from Ceylon with cholera amongst the troops on board. The troops were temporarily isolated in Fort Staddon, and the steps taken to prevent the spread of the disease were entirely successful. Enteric fever, in marked contrast with the previous year, was almost absent from the district, the three isolated cases that occurred having presumably been contracted outside barracks. There was, however, a serious outbreak of diphtheria amongst children in

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the Raglan barracks, definitely aggravated by, if not attributed to, defects in the drainage, which have since led to the barracks being vacated. There was very little prevalence of other zymotic disease, with the exception of measles at Bodmin and Brecon. Venereal diseases diminished generally, as compared with 1896, but were exceptionally prevalent amongst the troops in Fort Tregantle, Devonport, and Newport. At other stations in the district the admission rate for these diseases was comparatively low.

The following is a summary of the reports regarding the sanitary conditions in the several stations of the district.

At *Bodmin* there was nothing to note, except the prevalence of measles and the almost entire absence of venereal disease. No sanitary defects or improvements are noticed.

At *Brecon* the sanitary conditions of the barracks generally are good, the only defects noted being the want of a special room for examining recruits. Measles and scarlet fever were prevalent in the neighbourhood, two cases of the latter occurring amongst the troops and 42 of the former amongst the children.

At *Horfield* the only zymotic disease was scarlet fever, of which two cases occurred amongst the men and one amongst the children. The cases were sent to the Civil Infectious Hospital at Bristol. Some defects in the drains were brought to notice during the year, especially in connection with the officers' quarters and hospital, where the drainage has since been under reconstruction.

At *Cardiff* there was no zymotic disease. The general reconstruction of the drainage of the barracks was continued during the year. The ablution arrangements have been somewhat improved, an additional hot-water bath having been provided This is, however, still said to be insufficient for the large number of recruits examined. The want of a store room at the hospital and waiting and examination rooms for recruits is also noted. The water supply has to be pumped up to barracks, and the supply is, in consequence, said to be intermittent.

At *Devonport* the station hospital drainage system is still under reconstruction, having been found very defective. The new block was completed and handed over for occupation in November. It contains four general wards of 16 beds each, with special wards, recreation rooms, and duty rooms for the nursing sisters and orderlies. The enlargement of the pack store has been carried out ; but improved barrack accommodation for the Medical Staff Corps, and general repairs in the old blocks, are noted as being much needed. The Eastern King's Redoubt was used as a hospital for cases of infectious disease. At Bull Point Barracks nothing of importance is noted in connection with the sanitary conditions. The general sanitary condition at Forts Bovisand and Staddon is reported to be fairly good, the chief defects noted in the latter being the defective condition of the lavatories and latrines. A note is also made of the unsatisfactory arrangements for supplying water at Fort Staddon, and of the insufficiency of accommodation for married families. At Maker Barracks there was nothing of importance to note during the year, and the health of the troops is reported to have been good. At Forts Crownhill, Egg Buckland, and Efford, the health of the troops was excellent and there was also little of importance to note during the year. Of the barracks in Plymouth the Citadel and Millbay Barracks are reported to be very old, and it is difficult to keep them clean and in good sanitary condition. The former are being reconstructed and one building (officers' quarters and mess) is approaching completion. The disused officers' quarters is being demolished. With the exception of Elphinstone Barracks the latrines and ablution rooms generally are unsatisfactory and difficult to keep in good order. The outfall of sewers from the town in the neighbourhood of the officers' quarters at Elphinstone Barracks is still noted as constituting a nuisance, and it was found necessary to discontinue bathing parades, on account of the insanitary condition of the beach. With regard to the Devonport Barracks (Mount Wise, North and South Raglan, Old and New Granby, and Army Ordnance Corps Barracks) the chief defect brought to notice was the defective state of the drains in the Raglan Barracks, which, as already noted, led to the barracks being vacated about the middle of the year. The drainage is now being reconstructed and the barracks are being generally overhauled.

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At *Exeter* the general health of the troops was very good, the medical officer in charge specially noting the great diminution in admissions for venereal disease (namely, 14, as compared with 47 and 71 in the two preceding years), a fact which he attributes, in some degree at least, to the removal of several women from the neighbourhood who were spreading the disease. With regard to sanitary conditions, it is noted that there is insufficient hospital accommodation, a barrack room having to be used as a supplementary hospital. The drainage of the hospital has been improved; and, amongst other sanitary works carried out during the year, were the re-roofing of the Artillery Barracks at Topsham, and the completion of the drainage reconstruction in the Higher Barracks.

At *Newport* nothing is noted, with the exception of the unsatisfactory condition of the mortuary, which requires a proper table, sink, and water supply.

The sanitary conditions at *Okehampton* are reported to be fairly good, the system of drainage into soakage pits and the insufficiency of water supply being noted as the chief defects.

At *Pembroke Dock* the sanitary condition of the hospital and hut encampment is unsatisfactory. The hospital is generally unsuited for hospital purposes, the huts being old, and the position bad. The surface drainage of the encampment was much out of repair, although a portion was relaid during the year. The water of the Fortland Well has been used for ablution purposes only, and was kept discoloured by the addition of permanganate of potash. The drinking water was derived from another well in barracks and from rain-water, and is reported to be good and sufficient. In the Defensible Barracks the ablution rooms and cook-houses are reported to be dark and badly ventilated. The whole system of drainage has been reconstructed. There are no married quarters in these barracks, the families being accommodated outside barracks or in lodgings. At Pater Battery Barracks it was noted that the water supply from the Admiralty reservoir was limited, and its quality unsatisfactory. In summer the supply was for a time cut off, and water had to be obtained from the Defensible Barracks. Improvements were effected in the drainage and water supply at Fort Hubberstone, but increased latrine accommodation is considered desirable. At South Hook Fort the accommodation for married soldiers is considered unsatisfactory. At Penally Barracks the water supply, which is derived from springs, is barely sufficient during the summer when the weather is dry and a large number of troops is in camp. Some minor improvements were effected during the year in the flooring of the barrack rooms and in the latrines.

At *Taunton* the urinals and latrines were improved during the year, and flushing tanks provided for the drainage system. A portion of one of the barrack rooms was appropriated as an inspection room for recruits.

At *Fort Tregantle* the sanitary condition is reported to be generally good, and nothing of importance was noted during the year.

Southern District.

The Principal Medical Officer (Surgeon-Major-General C. McD. Cuffe, C.B.), reports that the general health of the troops during the year was good. Scarlet fever was prevalent in the district during the year, more especially at Portsmouth, Gosport, Hilsea, and Dorchester, and of the 40 admissions amongst the troops all but one occurred at these four stations. The children were, however, affected to a small extent only. There was an epidemic of rubella at Devizes, and seven cases occurred amongst the troops there. Measles was epidemic amongst the children at Portsmouth and Gosport, but other stations were comparatively free from the disease. Diphtheria was practically absent from the district, there being only one admission during the year among the men and one among the children. There were 3 cases of enteric (1 at Portsmouth and 2 at Parkhurst) as compared with 9 in 1896. Venereal diseases showed high admission rates at Portland, Hilsea, and Portsmouth, and exceptionally low rates at Devizes and Winchester, there

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being only 3 admissions at the latter station in an average annual strength of 187.

At *Christchurch* nothing of importance is noted in regard to sanitary conditions.

At *Devizes* considerable difficulty was experienced in the disposal of sewage, the sewage irrigation fields having become water-logged. As a temporary measure, since October, the sewage has been removed in carts by contractors, but this method has led to a certain amount of spilling of the contents along the roads.

At *Dorchester* scarlet fever was epidemic amongst the civil population, but the children of the garrison were not permitted to attend school, and no cases occurred amongst them. Two cases occurred amongst the men in January, apparently contracted in the town, but the disease did not spread in barracks. Two more cases occurred in July in the 7th Field Battery, Royal Artillery, on its arrival from Newcastle-upon-Tyne, the disease having been contracted on the march. Several sanitary improvements were effected during the year, notably in the drainage, flooring, and ventilation of the Royal Artillery Barracks. The absence of fireplaces in the bedrooms of the married quarters continues to be noted as a sanitary defect.

At *Gosport* there were some isolated cases of scarlet fever, the origin of which could not be traced. The sanitary conditions generally were satisfactory, the tendency to dampness in the basement rooms and the difficulty of maintaining a hot water supply and warmth in the station hospital being the chief defects noted. In the outlying forts several sanitary improvements were effected, notably the reconstruction of the drainage of the officers' quarters at Fort Rowner, the re-flooring of the barrack rooms in Fort Grange, and the provision of a new water supply from a deep well in the chalk at Foxbury, to replace the Alverstoke supply. The new main drain for the whole line of forts, emptying at Stokes Bay, was advanced during the year.

Scarlet fever was prevalent among the civil population of Fareham and Cosham, and several cases occurred amongst the troops, both at *Hilsea* and in the *Portsdown Hill Forts*. No insanitary condition was noted in the Hilsea Barracks, but it is noted that an increase in the accommodation for married families is desirable: and that the sale of bacon at the canteen had to be stopped altogether on account of the frequency with which the supplies had been condemned. The drains at Tipnor Fort were frequently blocked. At Fort Purbrook there is a risk of the sewage polluting the Portsmouth water supply, which is derived from springs at the foot of the hills, and a scheme has been adopted for conveying it to a sewage farm on the north of the hill. At present the sewerage of the Portsdown Hill Forts discharges into cesspits.

At *Golden Hill Fort* (Isle of Wight) the old hospital still exists but the construction of a new hospital, outside the Fort, is contemplated. The water from the Freshwater Company's mains is said to be sometimes slightly brackish in taste, but "otherwise the quality is good, though the dangerous practice of building houses around the source of supply, (each with its cesspit), still continues." The condition of the barracks generally is satisfactory, but the want of a supply of hot water laid on to the ablution rooms is much felt, and the ground floor rooms of the married quarters and officers' mess are dark, gloomy and unsuitable for occupation. The guard room and cells are also reported to be dark and ill-ventilated. The condition of the outlying forts is satisfactory.

At *Parkhurst* the old wooden huts are in process of being replaced. The water supply for drinking and cooking is separate from that for flushing. The latter is obtained from impure sources (reservoirs and wells), while the former, the Carisbrooke water, is said to be liable to pollution from the cesspools of many houses on the hill-side near the source. A new water supply will, however, shortly be obtained from an area about four miles distant, and away from the vicinity of houses. The drainage and water-closets of the hospital are antiquated. The rain-water pipes of barracks and married quarters have been disconnected from the drains, and the general reconstruction of the barrack drainage was completed by the end of the year.

At *Sandown* it is noted that the ablution accommodation is insufficient, especially when the militia are up for training. Improvements were effected in the drainage, foul drains running under inhabited buildings having been removed, and the rain-water pipes having been disconnected.

At *Portland* the station hospital is a part of the casemated barracks and cannot be considered a suitable building. It is noisy, there is no exercise ground for the patients except the barrack square, and there is no ward for infectious cases. A latrine has been provided in the infant school. The sanitary condition of the town is bad, the old midden system of sewage disposal prevailing, and the water supply being from surface wells, &c. The water supply to the barracks was deficient during the summer months, especially for flushing and ablution, and it is contemplated to increase the supply by connection with the Weymouth water supply.

At *Portsmouth* the general sanitary condition was good, and no extensive improvements were made or required. An old building in Anglesea Barracks was vacated and a new one in Clarence Barracks occupied. The St. George's buildings married quarters, hitherto hired, have been purchased and improved by the War Department, and three old cottages close by demolished to improve light and ventilation.

At *Southampton* and at *Trowbridge* nothing of importance is noted.

At *Weymouth*, steps were being taken to improve the canteen and the married quarters accommodation, and minor improvements were effected in the drainage.

At *Winchester* no insanitary conditions are reported, and the general health of the troops stationed there was exceptionally good, the admission rate being only 256·3 per 1,000, and the constantly sick rate 10·37.

A Cavalry camp was formed at *Bulford* on the Salisbury plain, and the sanitary conditions were considered satisfactory. The water supply was from "Nine mile" stream and was of good quality, though at one time the supply is said to have nearly ceased. The drainage was also considered satisfactory, but it is stated that, if heavy rains had set in, the water supply would have been polluted by the camp drainage. A "Tortoise" field oven was used in the field hospital and was favourably reported upon.

Netley.

The Principal Medical Officer, Surgeon-Major-General W. Nash, M.D., reports that the sanitary conditions generally were satisfactory, and no defects or improvements are specially noticed. The condition of the Lunatic Hospital is also reported to be satisfactory. Of the number discharged from this hospital during the year 71 per cent. are noted as recoveries. In 1896 there were 72 per cent. recoveries and in 1895, 65 per cent. The total number of invalids from abroad admitted during the year to the general hospital, was 2,638, of whom 23 died, 962 were discharged to duty and 1,429 were invalided from the service. The Hermite system of sewage disinfection continues to work satisfactorily.

Thames District.

The Principal Medical Officer (Surgeon-Colonel R. P. Ferguson) reports that the health of the troops has on the whole been very good, and the year under review compares favourably with the previous year, and very favourably with the average for the preceding ten years.

There was no extensive outbreak of zymotic disease at any station in the district, but scarlet fever, measles and rubella were prevalent to some extent at Shoeburyness, and diphtheria at Chatham. Thus, all but 2 out of 11 scarlet fever cases amongst the troops in the district occurred in No. 2 Company E.D., R.A., at the former station, while all but one of the diphtheria cases amongst men, women and children occurred at the latter station, where the disease was prevalent amongst the civil population. There were 5 cases of enteric fever in the district amongst the men, 3 at Shoeburyness and 2 at Chatham, and 4 amongst children living in lodgings in Maidstone, during the time of the great epidemic there. Venereal diseases show a

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comparatively low prevalence in the district, but of individual stations, Chatham gives a comparatively high admission rate, while Shoeburyness is exceptionally free, with an admission rate of only 50·5 per 1,000 of strength, as compared with 143·8 at Chatham.

With regard to the sanitary conditions of the several stations, the Principal Medical Officer reports that at *Chatham* the vicinity of the barracks is being much improved by the introduction of a new system of drainage to replace the old cesspits. The condition of the ablution rooms in the Chatham barracks has been considerably improved and three extra rooms added. Although no hot water is laid on, it is noted that hot baths can be obtained at the Garrison Institute, the only charge being 1½*d.* for towel and soap. There are 8 hot water baths at this Institute, 4 having been added in July, 1897, and as an instance of the extent to which they are used, it is noted that during the last quarter of the year 3,200 baths were provided. At Brompton barracks the drainage of the North Square has been remodelled and the old flooring is gradually being renewed. The drainage of Fort Pitt has also been relaid and the casemate wards have been very much improved by constructing new and enlarging existing windows. There is insufficient accommodation for families in the Brompton and St. Mary's barracks, and it is noted that all but 2 of the 10 cases of diphtheria amongst children on the strength occurred in families living in lodgings.

At *Gravesend*, in marked contrast with the previous year, there were no cases of infectious diesase, although it is estimated that, inclusive of militia, etc., 12,816 of all ranks passed through the station during the year. An isolation ward for infectious diseases is being built at the station hospital. During the month of April, some overcrowding took place, owing to the arrival of the Militia and Musketry parties, the condition lasting 33 days, during which time many of the men were obliged to sleep on the floors. Some difficulty was experienced in maintaining the camp in a satisfactory sanitary condition. The married quarters at Tilbury Fort were reported to be damp and unfit for habitation. Efforts have been made to remedy the insanitary conditions, and a proposal to erect new married quarters is being considered.

At *Maidstone* the sanitary conditions were considered satisfactory and the health of the troops very good. Notwithstanding the severe outbreak of enteric fever amongst the civil population, the troops and families in barracks remained free from any sickness except of a trivial character. Recruiting was stopped during the prevalence of the enteric fever epidemic.

At *Sheerness*, although it is noted that scarlet and enteric fevers were prevalent amongst the civil population, for whom there is no hospital accommodation or disinfecting chamber, the troops and families in barracks were remarkably free from these diseases, no cases of enteric and only 4 of scarlet fever having occurred during the year. It is noted that the water supply for the troops is from a deep well in War Department ground and is ample and good, being quite independent of the town water supply, which was said to be irregular and deficient from imperfect working of the pumping engines. The Goux system of conservancy is in use in the Royal Artillery barracks, but the water carriage system is used elsewhere. No unsatisfactory report is submitted this year regarding the former. Amongst sanitary improvements, it is noted that the drainage of the infant school has been relaid and that of Grain Fort much improved. New water-closet fittings have been provided at the station hospital. It is noted that hot water baths can be obtained at a charge of 1*d.*

At *Shoeburyness* the outbreak of scarlet fever in No. 2 Company, E.D., R.A., has been already noted. The company was placed under canvas in strict quarantine, and no other units were affected. The sanitary condition of the villages in the vicinity has been greatly improved by the completion of a new water supply and drainage scheme, and it is noted that enteric fever has been much less prevalent amongst them than in the preceding years. In the barracks several minor improvements were carried out, and extensive alterations and additions to the officers' mess are in progress. At the station hospital, a room for the medical staff corps and a waiting room for the patients have been provided, and certain disused waterclosets have been demolished. The regimental institute generally and the married

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quarters do not afford sufficient accommodation for the garrison. With regard to the latter, it is anticipated that 32 new quarters will shortly be constructed and thus enable the old dilapidated huts to be vacated; but there will still be a demand for more quarters to relieve the overcrowded and unsatisfactory made-down quarters, occupied by the remaining families.

South-Eastern District.

The Principal Medical Officer (Surgeon-Colonel H. Comerford, M.D.) reports that the admission, death, invaliding and constantly sick rates were all lower than in the previous year, and that the health of the troops was very good. There were few outbreaks of zymotic disease during the year, the principal being five cases of scarlet fever amongst the men of the Seaforth Highlanders on their arrival at Dover from Aldershot, and epidemics of measles amongst the children at the Western Heights, Dover, and at Shorncliffe, and of whooping cough at Canterbury, necessitating the closing of schools. There were eight cases of enteric fever in the district, all amongst the men. Three occurred in the Seaforth Highlanders, (two contracted at Fort George and one connected with defective barrack drainage). Four other cases were attributed to insanitary conditions in the vicinity of Shorncliffe and Chichester, where the disease is said to have been prevalent amongst the civil population, and the eighth case occurred in a man on furlough from Hythe. The families were remarkably free from zymotic disease during the year, and with the exception of the outbreaks of measles at Dover and Shorncliffe, and of whooping cough at Canterbury, the only other form of zymotic disease recorded amongst them is a single case of diphtheria in a child on the lodging list at Dover. The prevalence of venereal disease in the district was at the rate of 112·3 admissions per 1,000 of strength, Brighton and Western Heights, Dover, being highest with 151·3 and 146·8 admissions per 1,000 respectively, and Dover Castle and Hythe lowest with 41·0 and 52·8 admissions per 1,000 of their strength.

At *Brighton* the barracks are old but no insanitary conditions were brought to notice during the year. The married quarters are insufficient for the number of families, and four good sanitary houses have been rented for the surplus families. The hospital is in an unsatisfactory condition, the woodwork having been found rotten. The whole building is being overhauled, new flooring is being put down and the surface underneath concreted. It is noted that much inconvenience is experienced in the examination of recruits, there being no room available for the purpose except the surgery, which is also the medical officer's office. There is no bath or place for the recruits to wash in, and they have to dress and undress in this room. There is no isolation ward, and cases of infectious disease are sent to the Borough Infectious Hospital.

At *Canterbury* the surface drainage is still noted as defective in parts, otherwise the drainage is said to be in good order, although it is noted that the water-closets and urinals are continually getting choked at the hospital. The infectious diseases ward at the hospital is not properly isolated, and additional means of warming the wards are recommended. The construction of a new isolation hospital is under consideration. Quarters for the nursing sisters are also under consideration. Some sanitary defects were found in their present quarters, which necessitated the quarters being temporarily vacated during the year. There is no separate lavatory for the Medical Staff Corps men, and the disinfecting room is obsolete, articles being disinfected, as required, at the disinfecting chamber belonging to the local civil authorities. The lighting at the hospital and the arrangements for supplying hot water to lavatories and baths are also considered unsatisfactory. With the exception of these points, the general sanitary condition of the barracks and vicinity is considered good; but some old huts in bad repair are still occupied by troops.

At *Chichester* no sanitary defects are said to exist, and no sanitary improvements were noted during the year.

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At *Dover Castle* the necessarily faulty lighting and ventilation of the casemates in the chalk cliff are again noted as having had no bad effect upon the health of the troops occupying them. At Fort Burgoyne the casemates are damp in winter, and it is noted that the ground outside requires draining. The drainage generally at Dover Castle has been improved during the year and at Guildford battery it has been renewed throughout. Several other minor improvements have been effected. Since March, the disused warders' quarters were occupied as married quarters, and afford excellent accommodation for 24 families, each family being provided with 4 living rooms, while there are a scullery and a washhouse for every two families.

At the *Western Heights* Barracks the general sanitary conditions were considered satisfactory, and, with the exception of some repairs and renewals of drains, nothing of special importance is noted in connection with defects or improvements during the year. The substitution of concrete for wood in the flooring of the station hospital water-closets is required.

At *Eastbourne* there were transferred to the station hospital, as convalescents, during the year, 40 patients from the station hospital, London, 4 from Dover, 3 from Windsor, 2 each from Hounslow and Canterbury, and 1 from Chatham. With scarcely any exceptions they benefited greatly by the change. The lighting of the hospital by paraffin lamps is considered unsatisfactory; and it is also noted that the married quarters at the Ordnance Yard are inclined to be damp and not very satisfactory, the ventilation being defective. Dampness is also said to be much complained of in the Redoubt barrack rooms in wet weather.

At *Hythe* there was some overcrowding in the barrack rooms, whilst the course of musketry instruction was being carried out, and, to obviate this, the provision of additional accommodation is under consideration. Some insanitary conditions in the vicinity of the quarters from the deposit of refuse on Hythe Green were remedied by the local sanitary authorities. The sanitary conditions generally are reported to have been satisfactory.

At *Lydd* nothing of the nature of sanitary defects or improvements has been noted during the year, and the general sanitary condition is very satisfactory.

At *Newhaven* also nothing of sanitary importance is noted.

At *Shorncliffe* the medical officer in charge specially notes an increase in the admission rate, due to the very large number of cases of catarrhal affections amongst the young soldiers of the Provisional Battalion, many of whom were special enlistments. The surface drainage of the camp, which is reported to be defective in many parts, was improved during the year in the Ross and Somerset barracks. The dry-earth system of latrines (Moule's) is reported to act in an unsatisfactory manner, constantly getting out of order, and needing much supervision, and some improvement was made in supplying dry earth. The open iron tanks used for slops from the married quarters are also reported upon as creating a nuisance. Nearly two-thirds of the old huts were demolished during the year, and only seven remained in occupation, exclusive of those used for stores, &c. Serious overcrowding is reported to have occurred in September, when detachments were brought from Dover for tactical purposes. At the station hospital the latrines in the old building are in bad repair on account of their age. In the new building defects are noted in the paint of some of the wards, and the need of an operating room, ophthalmic ward, lunatic ward, and disinfecting apparatus is felt.

Home District.

The Principal Medical Officer (Surgeon-Colonel T. O'Farrell, M.D.) reports that the admission, death, and constantly sick rates have been higher, but the invaliding rate lower, than in the previous year. The increase generally in the statistics of sickness is no doubt due to the extensive outbreak of scarlet fever at Caterham, where there were 292 admissions for this disease out of an annual average strength of 759. This epidemic has been already referred to. Scarlet fever and diphtheria are stated to have been prevalent

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during the year among the civil population in London, and most of the other cases of these diseases, occurring in barracks, were amongst troops and their families stationed there. Measles was not markedly prevalent except amongst the children in London and Kingston-on-Thames. Only one case of enteric fever occurred amongst the troops in the district, namely, at Hounslow. The case was a doubtful one. There was also a case of enteric fever, a woman of the Royal Horse Guards, stationed at Windsor. The ratio of admissions for venereal diseases in the district was 165·2 per 1,000; the highest admission rates being 252·1 per 1,000 amongst troops in London, S.W., and 194·6 amongst infantry at Windsor, while the lowest were 26·1 at Caterham and 38·9 per 1,000 at Reading. At all the other stations in the district these rates were below 100 per 1,000 except amongst the 2nd Life Guards at Regent's Park, where the ratio was slightly higher.

The following sanitary notes are compiled from the reports on the various stations in the district.

At *Caterham* there was great deficiency in barrack and hospital accommodation and in means of isolation. During the scarlet fever epidemic, already noted, 12 barrack rooms or three blocks were utilized as hospital wards, and accommodation was provided for the men in tents. The drains are noted as requiring frequent flushing, and the latrines are said to be insufficient for the number of men in the garrison. The infants' and adults' schools are stated to be too small, the former difficult to ventilate properly, and the latter without latrine accommodation. Otherwise the sanitary conditions generally are regarded as satisfactory. Straw has been substituted for coir fibre in the bedding, and steps are being taken to increase the hospital accommodation by the construction of a new infectious hospital with steam disinfecting apparatus and by adding to the existing building. The barrack accommodation is also being increased by the erection of corrugated iron huts.

At *Guildford* the sanitary condition of the barracks is reported to have been satisfactory. The drains near the sewage tanks have been relaid. The medical officer in charge notes that there is considerable risk of infectious or contagious diseases being spread by men coming up for enlistment. There is no receiving room for them and they are accommodated for the night in a portion of a barrack room, where they mix more or less freely with the troops. "Many of these men come up in a very filthy state," and a receiving room, where they can be kept separate from the troops, is said to be badly needed.

At *Hounslow* the health of the troops was very good and showed a marked improvement as compared with previous years. The whole of the drainage system has been under reconstruction, the old defective drains being removed as each section of the new drains is completed. The station hospital was vacated from May to September and the sick treated in huts during the reconstruction of its drainage. At the same time three blocks of married quarters near it had to be vacated in consequence of the foul state of the old drains. The families were accommodated in lodgings. A new canteen (dry) was constructed and opened during the year in the Infantry lines. Considerable sanitary improvements were effected in Kneller Hall Barracks.

At *Kingston-on-Thames* minor improvements were carried out chiefly in connection with the flooring of urinal and lavatory and in repairing defects in roofs. New water-closets were constructed in the hospital and for officers' servants.

In *Regent's Park Barracks*, occupied during the year by the 1st and 2nd Life Guards, no sanitary defects or improvements are noted.

The barracks in *London, S.W.*, are reported to be in a fairly satisfactory condition, a new system of drainage having been completed at Chelsea barracks, while a similar improvement is approaching completion in Kensington barracks. Some minor improvements have also been effected in Wellington and St. George's barracks, and at the Station Hospital in Rochester Row. The lack of proper and sufficient hospital accommodation, both for general and infectious diseases, is very much felt. During the year 623 cases had to be transferred to other hospitals on account of insufficient accommodation.

At the *Tower of London* the barrack rooms have been enlarged by

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removing partition walls, and the sanitary conditions generally are considered satisfactory with the exception of the arrangements for the removal of slops and refuse from the married quarters.

At *Oxford* steps have been taken to provide inspection pits and flushing tanks for the drainage system. Some defects have been noted in connection with the latrines. Improvements have been made in the hospital water-closets.

At *Reading* nothing of importance was noted, and no insanitary conditions are said to exist.

At *Windsor* the drainage of the officers' quarters in the cavalry barracks is reported to be defective, and steps were being taken to have this remedied. The drainage generally is only considered fairly good by the medical officer in charge. The ablution and bath accommodation at the infantry hospital is reported to be insufficient, but the general sanitary condition of the barracks is reported to be very good. The Principal Medical Officer notes that the provision of a new hospital is needed.

At *St. John's Wood* a hot water bath has been provided at the hospital. The sanitary conditions have been satisfactory. The married quarters are noted as insufficient and families have to be accommodated in buildings outside barracks. The Principal Medical Officer notes that the entire drainage is to be reconstructed.

Woolwich District.

The Principal Medical Officer (Surgeon-Colonel R. P. Ferguson) reports that the health of the troops has been good during the year. Measles accounted for 4 admissions amongst the men, none amongst the women, and only 3 amongst the children. Scarlet fever was much less prevalent than in 1896, there being only 27 admissions as compared with 54. Five men and 11 children were admitted for diphtheria, and there were six cases of enteric fever; none of these diseases, however, are attributed to any insanitary conditions in barracks, and two of the cases of enteric were admitted from on board ship. The admissions for venereal disease were comparatively high in the district, amounting to 179·8 per 1,000 of strength. The reconstruction of the drainage of the Royal Artillery Barracks has been completed, and, generally throughout the barracks at Woolwich, the drainage has now been reconstructed wherever required. The ablution rooms of the Royal Artillery Barracks are highly praised, hot and cold water being laid on to the lavatories, but the other barracks are not so well equipped. At the Herbert Hospital the old pattern water-closets have been replaced by new. The hot water heating apparatus for wards and passages was not in working order during the year. The Principal Medical Officer states that a small isolated hospital for infectious diseases is much needed. One case of scarlet fever occurred in a patient who had been 17 days in hospital for other disease. A mortuary is needed at the auxiliary hospital, and a drying room at the hospital for soldiers' wives and children is being constructed. At *Purfleet* hot water has been laid on to the hospital bath, and generally the sanitary conditions are considered satisfactory. The health of the cadets at the *Royal Military Academy* was reported to be very good and the sanitary conditions there satisfactory. More than one-third of the admissions to hospital were due to injuries the result of accidents at gymnastics, riding, gun-drill, football and other athletic sports, and a large proportion of the remaining admissions was due to influenza and simple continued fevers. "The latter were probably induced by cadets taking cold baths when fatigued and heated after athletic games, and the practice was stopped with good results to health." The average duration of each case of sickness amongst the cadets was only 4·95 days.

Aldershot.

The Principal Medical Officer (Surgeon-Major-General T. F. O'Dwyer, M.D.) reports that there was generally an increase in the ratios of admission, *United Kingdo*

mortality and constantly sick as compared with the previous year, but a considerable decrease as compared with the average for the preceding ten years. The invaliding rate was slightly lower that in 1896, but above the average ratio. The number of admissions amongst the troops for the more important zymotic diseases was considerable, namely, 15 for measles, 87 for scarlet fever, 22 for diphtheria, and 10 for enteric fever. The officers and women were remarkably free from zymotic diseases, four cases of scarlet fever amongst the former and two of measles, five of scarlet fever, and four of diphtheria amongst the latter, being the only admissions. Amongst the children there were 126 cases of measles, 148 of scarlet fever, and 96 of diphtheria. As compared with the previous year, the chief points noted are a large decrease in diphtheria and increase in scarlet fever amongst the troops, and a large increase in measles, scarlet fever and diphtheria amongst the children. All these diseases are stated to have been very prevalent amongst the civil population at Aldershot, but with regard to the decrease in diphtheria amongst the men it is noticed that the cases were carefully watched bacteriologically, and there was reason to believe that the completion of the reconstruction of drainage in the cavalry barracks had a beneficial effect, no cases having occurred there in 1897, as compared with 16 in 1896. The outbreak amongst the children has already been noted as originating in defective drainage in Thornhill Terrace, Stanhope Lines, and as being confined to these lines. Some of the cases occurred amongst children convalescing from scarlet fever, and the medical officer in charge of the infectious diseases hospital attributes their origin to a rubbish heap in the neighbourhood. Seven of the enteric fever cases are reported to have been contracted elsewhere. The remaining three cases, supposed to have been contracted in the station, do not appear to have been due to insanitary conditions in barracks, but the milk supply was suspected. Venereal diseases compare somewhat favourably with other districts in the United Kingdom, and the admission ratio, 130·0 per 1,000, shows a general decrease as compared with 1896 and the preceding ten years.

In the Royal Horse Artillery Barracks a new building was occupied towards the end of the year, thus bringing the accommodation up to requirements. The married quarters are noted as being insufficient, but two new blocks for 10 staff-sergeants and 22 rank and file, were completed during the year. The drainage of the cavalry barracks, east and west blocks, was completed during the year.

Generally, the sanitation of Aldershot Camp is considered very satisfactory, the chief requirements noted by the Principal Medical Officer being the improvement of the barrack-room lighting, of the ventilation of the old married quarters in Marlborough Lines and of the condition of the ground about barracks, the provision of drying rooms and hot water baths, and the extension of the school of cookery. The new hospital in Marlborough Lines was completed but was not occupied during the year. The western wing of the Cambridge Hospital was also completed, thus bringing the estimated accommodation up to 447 beds, and a new operating theatre and bacteriological laboratory were provided. Lectures on sanitary matters were instituted for quartermasters of regiments, with satisfactory results, and much generally was done to create a general interest in sanitation throughout the camp. The sewage farm was maintained in a satisfactory condition under the present management, and steps were taken to protect the collecting areas of the Bourley water supply from pollution.

At *Woking* the sanitary condition of the barracks and their surroundings is reported to be satisfactory, but the medical officer in charge notes the large number of admissions for affections of the throat, amounting to 12 per cent. of the total admissions and exceeding 11 per cent. of the average annual strength. He attributes this to old pollution of the soil, by the previous cesspool system of sewage disposal.

At the *Royal Military College, Camberley*, no insanitary conditions, were noted during the year, and, with the exception of an outbreak of influenza during the spring and summer months, the health of the cadets has been good, the average number of constantly sick being 2·60 in an average annual strength of 265, and the average duration of each case of sickness only 5·93 days. The improvement of the drainage was continued during the year.

Channel Islands.

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The Senior Medical Officer (Brigade-Surgeon R. Batho, M.D., R.P.) reports that the general health of the troops in the Command was very good during the year, the admission rate being 500 per 1,000. There was scarcely any zymotic disease, the only cases of an important character among the troops being two of scarlet fever in Jersey, and one of enteric fever in Alderney, supposed to have been contracted before the man's arrival in the island. The soldiers' families were almost entirely free from infectious diseases, the only case recorded being a fatal case of diphtheria in the family of a sergeant of the militia staff living in St. Peter Port, Guernsey. Venereal disease showed considerable prevalence, causing an admission rate of 179·4 per 1,000 in Alderney, of 151·6 per 1,000 in Jersey, and of 129·7 per 1,000 in Guernsey; or 148·8 per 1,000 for the whole Command. In Guernsey a Contagious Diseases Act came into force in the earlier part of the year, and to its influence is attributed the lower rate of admission there. In 1896 the admission rate for venereal diseases in Guernsey was 185·4 per 1,000 of strength.

In *Alderney* the latrines of Fort Tourgis are old and out of repair; those in Fort Albert were reconstructed during the year, with the exception of the water-closet in the officers' quarters, which is reported to be very defective. The main drain in the latter fort was extended to high-water mark. At Fort Essex the underground stores at the hospital are very damp, and it is noted that the flat concrete roofs leak and require renewing, especially in the infectious ward and kitchen.

In *Guernsey* the accommodation in barracks was at times insufficient, and to prevent overcrowding men are placed under canvas in summer, and some men were transferred to Fort Hommette in winter. The accommodation for families was unsatisfactory, and Fort Jerbourg has been arranged to provide accommodation for nine families. This is considered inconvenient for the children attending school and the men performing duties at Fort George, which is two miles distant. At Castle Cornet provision for keeping dry earth for latrines is required. At Fort Jerbourg the hand pumps were replaced by air motors, and at Fort George works were in hand to convert Adolphus Battery into an infant school and to provide a spring water supply to the officers' quarters and mess.

In *Jersey* the Elizabeth Castle Barracks are apt to be damp and draughty, and the lighting in the school room is defective. At Fort Regent the walls of the canteen are reported to be very damp. The hospital accommodation is insufficient, and patients have to be transferred to St. Peter's. At *St. Peter's* an isolation ward is required, and a detached married quarter for the hospital sergeant is also considered necessary, the present quarter consisting of one room and a small passage only, the latter being used for cooking purposes. It is noted that 72 cases of sickness, of which 48 were venereal, were sent direct into hospital at St. Peter's from Fort Regent; and it seems to have been the custom to send such cases there for treatment. This has since been altered.

Scottish District.

The Principal Medical Officer (Surgeon-Colonel J. P. Rooney) states that the health of the troops has been good and compares favourably with that of the previous year. Scarlet fever and measles were the principal zymotic diseases prevalent during the year, the former accounting for 5 admissions among the men and 29 among the children, and the latter for 15 among the men and 117 among the children. The scarlet fever cases were distributed throughout various stations, but at Piershill an outbreak is supposed to have been caused by an infected family occupying dairy premises from which some of the married families were in the habit of buying milk, and at Maryhill the cases were attributed to infection through school books, and the outbreak is stated to have been checked by disinfection of the books and the school room. The measles cases occurred chiefly at Fort George, where 41 children and 5 men were affected. Hamilton, Leith, and Stirling also

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showed considerable prevalence of this disease. Enteric fever caused one admission at Fort George, one at Hamilton and one at Maryhill. A choked drain in the first and a faulty trap in the second are noted as causes of the disease. The third case was not attributed to defects in barracks. The district shows an admission rate of 99·9 per 1,000 for venereal disease; Maryhill with a ratio of 173·6, having the highest prevalence, the garrisons in and around Edinburgh coming next with an admission ratio of 120·2 per 1,000. At all other stations the ratio was below 100 per 1,000. As regards sanitary defects and improvements the following have been noted at the several stations in the district.

At *Aberdeen*, *Berwick-on-Tweed*, and *Blackness Castle* nothing of importance was recorded.

At *Ayr* improvements in the latrines of the married quarters are still under consideration.

At *Barry Camp* the drains are unsatisfactory as they get frequently choked with sand and have insufficient outfall. Cases of pneumonia and rheumatism frequently occur in consequence of cold and wet, and the medical officer in charge of the camp recommends the provision of a drying shed and recreation room for the men. The musketry camp at *Irvine* is again reported to have been very healthy.

At *Edinburgh Castle* the new station hospital is being rapidly constructed, but the ordinary sick continue to be sent to Piershill, Leith Fort or Glencorse, serious cases to the Royal Infirmary, and infectious cases to the city epidemic hospital. The ventilation and warming of the barrack rooms, &c., are reported to be unsatisfactory. The bath accommodation is also reported unsatisfactory, and it is stated that the latrines of the new barracks are insufficiently lighted, and that there is an unclosed urinal pipe in the prisoners' room. The married quarters have been increased by hiring quarters for ten families in Castle Wynd, where, however, the position of the water-closets in the centre of the building is unsatisfactory.

At *Leith Fort* the barracks and hospital are of old construction and difficult to keep in repair. The latter is reported to be much closed in and unsuitable for the treatment of prolonged cases of illness. The floor of the covered way between the hospital blocks requires relaying. A sink has been constructed in the surgery during the year. The rain-water tanks caused some trouble, remnants of food, &c., having been thrown into them by the men. They are without covers and close to the barrack room windows, and offensive smells were generated in them. It is proposed to remedy this by providing covers to the tanks.

At *Piershill* the drainage was partly reconstructed in connection with the erection of new buildings in the vicinity. The baths are only imperfectly supplied with hot water, but some improvement has been made, in this respect, regimentally. The bath accommodation in the hospital is also considered insufficient for the number of sick.

At *Fort George* the ventilation and warming were improved by the provision of new ventilating grates to the barrack rooms, and the water supply has been increased by the use of a windmill. The guard room drain, which was found choked from want of flushing and insufficient outfall, was put in good order, and a 300 gallon flushing tank added. In connection with the case of enteric fever, already referred to, a careful inspection was made of the dairies which supply milk to the troops. This led to the discontinuance of the supply from one farm, which was found in a dangerously insanitary condition.

At *Maryhill* a reconstruction of the night urinals is recommended, and the infant school is reported to be too small. Otherwise no sanitary defects are noted.

At *Glencorse* the general sanitary condition is reported to be very good especially the arrangements for ablution. The water supply is apt to be turbid.

At *Hamilton* proposed improvements in the latrines of the married quarters are under consideration; as is also the reconstruction of the huts, which are reported to be damp and badly constructed.

At *Inverness* the medical officer in charge continues to note the fact that a school in barracks for the children and a canteen store are much required.

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It is also noted that the provision of double windows to the hospital would be a great improvement. The barracks generally are in good sanitary condition. One of the married quarters was reconstructed as a warrant officers' quarter and the floor of the surgery was renewed during the year.

At *Perth* the latrines of the barracks are said to be of an obsolete pattern, and are being replaced. Otherwise the general conditions as regards sanitation are satisfactory. It is noted that during the winter months a supper meal is provided for the men which is much appreciated.

At *Stirling* the water supply, moorland surface water, is apt to be full of sediment, and filter beds were constructed at the reservoirs, during the year, with good effect. The general sanitary conditions are satisfactory, with the exception of an insufficiency of bath accommodation and a badly placed, disused latrine, connected with one of the married quarters. The medical officer in charge also notes the inconvenience to patients of having the hospital latrines and ablution rooms at a distance from and on a different floor to the wards.

The Principal Medical Officer, in concluding his sanitary report, remarks generally that a "pressing sanitary defect throughout the district is the insufficiency of the bathing and ablution accommodation, the arrangements at most stations being of the roughest and most primitive" nature.

Belfast District.

The Principal Medical Officer (Surgeon-Colonel W. Graves) reports that the general health of the troops was very good during the year, but in some respects the statistical records do not bear this out, in consequence of the marked increase in venereal diseases. Admissions for zymotic disease, however, show somewhat improved conditions. Thus diphtheria accounts for two admissions only as compared with 53 in the previous year amongst the men. Both cases occurred at the same time and in the Willow Bank Huts at Belfast. Amongst the children there were 14 cases, as compared with two in 1896. All occurred at Belfast, principally amongst children living in lodgings in the town. Four, however, occurred in one family living in the married quarters in Victoria Barracks and were attributed to an insanitary yard in the vicinity. The decrease in diphtheria amongst the troops is attributed to the improved drainage, constructed in 1896, and to the evacuation of the Willow Bank Huts, on completion of the new barracks at Holywood. It should be noted, however, that with the exception of the cases in 1896 and four cases in 1895, no case of diphtheria occurred amongst the troops in Belfast for many years. The admissions for throat affections in 1897 at Belfast were 68 as compared with 213 in 1896. There was very little scarlet fever in the district during the year, either amongst the troops or amongst the families, a total only of 4 for the former and 5 for the latter being recorded. Measles affected the families only, the 66 admissions being practically all due to outbreaks at Belfast and Newry. Enteric fever caused 5 admissions, one being amongst the families and all occurring at Belfast. Three of the cases were living out of barracks, one was a recruit recently joined, while nothing to account for the fifth case could be discovered in barracks. The increase in venereal disease is due to a high rate of admission at nearly all the larger garrisons in the district. Thus, Holywood shows a venereal admission rate of 314·0 per 1,000, chiefly attributable to the prevalence of the disease in the 2nd King's Liverpool Regiment. Belfast comes next with a ratio of 254·2 per 1,000, followed by Newry with a ratio of 237·7 per 1,000. The latter station shows a remarkable increase as compared with 1896, when the ratio was only 92·88, and, although the medical officer in charge notes that many cases were contracted in Dublin and The Curragh during June, July and August, or by men on furlough, several are said to have been due to contagion locally. All the other stations except Dundalk, have a venereal admission ratio under 100 per 1,000, while the ratio for the whole district is the comparatively high ratio of 180·5.

As regards the sanitary condition of the several stations, the following facts are noted.

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At *Armagh* the wooden huts are old, and constantly require repair, but otherwise no insanitary condition is noted.

At *Ballyshannon* there is no bath or ablution room in the hospital, but it is a small non-dieted hospital of two beds.

At *Belfast* the sanitary improvements noted in the report for 1896 have given much satisfaction, notably the reconstruction of the drainage. In July the huts at Willow Bank and Tram Stables were vacated, owing to the completion of the new barracks at Holywood, and the hospital accommodation, previously insufficient, is now adequate for all requirements. Arrangements have been made with the civil authorities for the disinfection of infected articles, and improvements have been made in the warming and means of cooking at the hospital. A medical inspection room for the families was also provided during the year. It is noted that Pasteurized milk was in general use in the barracks.

At *Belturbet* and *Drogheda* nothing of importance is noted in connection with the sanitary conditions. The former station was occupied from February till June, to avoid overcrowding at Dundalk.

At *Dundalk* the married quarters are stated to require sculleries, and the means of ablution generally in barracks are not considered satisfactory. The hospital is at times inadequate for the requirements of the garrison and has to be supplemented by tents. Improvement in the hospital accommodation generally is under consideration. The mortuary is said to be small, dark, and too near the kitchen.

At *Enniskillen* the barracks are old, and the cells of the guard-room dark and badly ventilated. The site of the barracks is also considered unsatisfactory, being too low and on the edge of the lake, but the medical officer in charge has not noted any bad effects during the year, and the station generally has been considered healthy for troops.

Holywood was occupied as a station for the first time. The barracks are situated near the Belfast Lough about 1 mile from the town of Holywood and about 4 miles from Belfast. The situation is considered very healthy, and is said to be sheltered from storms by a fairly well-wooded country. The barracks consist of seven two storeyed buildings constructed for 86 men each, and all the accessory buildings have been completed with the exception of married quarters and officers' mess. The drainage and ablution arrangements are stated to be perfect. Water is supplied by the Belfast Water Commissioners from the Stoneyford Waterworks. There is a water carriage system of sewage disposal. Incandescent lamps are used in lighting the rooms, and generally everything has been done to make these barracks model barracks. The station hospital, which was opened in February, gives equal satisfaction. It is a two-storeyed building with three wings, and accommodates 49 patients in 5 wards with a separate isolation building. The larger wards contain 16 beds, and the hospital is fully provided with all necessary accessories, including married quarters and barrack room for the Medical Staff Corps. It has also extensive grounds, which are being laid out as gardens. The medical officer in charge at Holywood states that the camp at Kinegar is not properly drained and recommends that the camping ground should not be used in wet weather.

At *Londonderry* many of the drainage pipes were renewed during the year. Eight new provost cells were constructed and a building remodelled into a sergeants' mess. The accommodation for families is insufficient and several live in lodgings. The infantry battalion in Londonderry and Enniskillen was in camp for two months at Finner during the summer, and derived much benefit thereby.

At *Newry* the remedying of the defects noted in the report for 1896, regarding the accommodation in barracks and the provision of the requirements noted in connection with the hospital building, are in abeyance, pending consideration of the question of retaining Newry as a station for troops. No sanitary defects are otherwise noted.

At *Omagh* no insanitary condition is noted.

Dublin District.

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The Principal Medical Officer (Surgeon-Major-General A. F. Preston, M.B.) reports regarding the health of the troops, that the admission and constantly sick rate have considerably declined during the year, as compared with 1896, but that the invaliding rate has again shown considerable increase, reaching the high ratio of 39·95 per 1,000 as compared with 29·76 in 1896 and 13·59 in 1895. The chief causes of invaliding in this district in 1897 have been varix (18 cases), disordered action of heart and epilepsy (15 cases each), caries of teeth (12 cases), hernia (9 cases), and tubercle of lung (9 as compared with 22 in 1896). The district also compares unfavourably with most other districts as regards the prevalence of zymotic and venereal diseases. Measles and scarlet fever were prevalent amongst the civil population in Dublin. Measles caused 12 admissions amongst the men, 2 amongst the officers, 3 amongst the women and 174 amongst the children of the various garrisons in Dublin, a few cases only occurring at other stations in the district. Scarlet fever caused 20 admissions amongst the men, and 20 amongst the families, the majority of the cases also being in Dublin, although isolated cases occurred at Athlone, Mullingar, Galway, Birr, Longford and Castlebar. Diphtheria gave 1 admission only amongst the men and 2 amongst the children; all at Dublin. Enteric fever accounted for 31 admissions, as compared with 32 in 1896, 4 being amongst the women and 4 amongst the children. The outbreak already alluded to in the 2nd Hampshire Regiment, at Birr, included 10 of these cases; 3 were contracted, it is said, by men of the Medical Staff Corps, who were nursing other cases of the disease; but, with the exception of one or two cases suspected of being caused by eating shellfish, no definite insanitary condition in barracks was discovered to account for the remaining cases. The disease is said to be endemic in Dublin, and 5 of the remaining cases amongst the troops occurred in the 4th Battalion Rifle Brigade, in Portobello Barracks, 3 in the Royal Infirmary and one each in the Marlborough Line, Linen Hall Barracks and Athlone. One of the men of the Medical Staff Corps attacked was also stationed at Athlone, after having been in attendance upon enteric fever cases in Dublin, and there was another case on the lodging list in Dublin. The cases amongst the women occurred 1 in Portobello Barracks, 2 in the Royal Infirmary and 1 in Mullingar, while amongst the children 3 were in the Royal Infirmary and 1 at Beggar's Bush. Venereal diseases show an admission ratio of 192·4 per 1,000 for the whole district; but for the Dublin garrison alone it is as high as 253·4 per 1,000. At all other stations, except Athlone, where the ratio was 122·5 per 1,000, the admissions were less than 100 per 1,000 of strength. As compared with 1896, venereal disease has been slightly less.

The following are the chief points noted in connection with the sanitary defects and improvements in the several stations of the district.

At *Athlone* it is noted that the regulation allowance of coal has to be supplemented for warming the hospital in the winter months, and that the disinfecting chamber is a hot air chamber which cannot be heated above 230° F. Otherwise no sanitary defects have been noted. Considerable improvements were made in these barracks in 1896, and during the year under review only some minor sanitary works, chiefly in connection with drainage, were carried out.

At *Birr* the general drainage of the vicinity of the barracks is said to be bad, and as a number of the families live in lodgings, they are exposed to these insanitary conditions. The drainage of the barracks generally is also reported to be bad, the sewers being of bricks, covered with flags and apparently leaking into wells, the water of which was being used for ablution purposes. The water for drinking comes from a pond close to the barracks, but the supply is insufficient in summer, and has to be supplemented by river water. In consequence of the outbreak of enteric fever in the Hampshire Regiment, a general scheme for the reconstruction of the drains has been sanctioned, and the wells have been closed. In other respects the sanitary condition of the barracks, etc., is reported to be satisfactory.

At *Castlebar* during the year a constant water supply was laid on to the town generally, the sources being mountain water obtained near the village of Ross, about 5 miles from Castlebar, and springs about ½ mile from the

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barracks. It is said to be of excellent quality, but it has not yet been laid on to barracks, to which drinking water is still supplied in barrels from a well in the town, while tanks outside the hospital gate supply water for other purposes. The latrine for women and children was reconstructed during the year.

At *Dublin*, the hospital building at Arbor Hill is old and dilapidated, and its construction generally falls short of modern requirements. The general sanitary condition of the Royal Barracks is satisfactory. It is noted that the ventilation of the infantry guard-room cells has been now made satisfactory. In some cases the married quarters are unsatisfactory, being only one-room quarters. At Beggar's Bush Barracks the general sanitary condition was also very satisfactory ; several minor repairs, chiefly renewals of flooring, having been effected during the year. It is noted that the fuel allowance is insufficient for warming the hospital in winter.

At Portobello there is said to have been a great improvement in the health of the troops during the year, the chief decrease being in the admissions for respiratory diseases and for accidents and injuries. During the year the reconstruction of the drainage of the west half of the barracks and hospital was completed, and the old wooden earth closets replaced by well flushed latrines. The station hospital building was reoccupied, after the reconstruction of its drainage, in April, but it contains many defects, and its reconstruction is under consideration. A scheme of subsoil drainage has also been undertaken with a view to lowering the subsoil water, which is said to rise in places to within 2 feet of the surface. The officers' mess and quarters, two blocks of married quarters and a recreation room, were completed and occupied, and all the families now live in barracks. These improvements are very favourably reported upon. Wellington Barracks were vacated at the end of August, and handed over to the contractor for reconstruction.

At Richmond Barracks the lighting by gas was considered unsatisfactory and some improvement has been made by the provision of new gas pipes. The sanitary conditions generally are considered satisfactory, and no important improvements or defects have been noted during the year.

At the Royal Infirmary the drainage of the basement is considered unsatisfactory, and improvements in this respect are under consideration. A scheme of reappropriation of the buildings is also under consideration, with a view to providing separate accommodation for the Medical Staff Corps, and erecting married quarters. A separate bath room for one of the wards in the infectious division is under construction, and application has also been made for the construction of separate lavatories and baths for the attendants. An operating theatre and the equipment for a small bacteriological laboratory have been provided during the year. The Island Bridge Barracks are only partially occupied by troops for sanitary reasons, but the married quarters are modern and good, and the health of the occupants during the year is reported to have been good. The Linen Hall Barracks, which were vacated on the 30th November, 1896, for the reconstruction of the drainage system, have now been reoccupied, the drainage being completed during 1897. At Marlborough Barracks nothing of importance was noted. The women's latrine at Marshalsea Barracks was reconstructed, and one of the quarters was vacated as unfit for habitation. The drainage of Ship Street Barracks was completely reconstructed during the year.

At *Galway* the health of the troops is reported to have been most satisfactory. The barrack rooms of the Castle and Shambles Barracks are said to be small and badly ventilated, but otherwise the sanitary conditions generally are considered satisfactory, with the exception of a bath room reported to be formed of a lean-to shed.

At *Longford* no insanitary condition is noted in barracks. The vicinity is said to be still far from sanitary, but improvements are being carried out.

At *Mullingar* the hospital was supplied with a Thursfield's steam disinfecting chamber, the provision of which has given much satisfaction. There is still insufficient accommodation for married soldiers, but otherwise the barracks, etc., are considered satisfactory.

At *Naas* the climate is very damp, and the provision of some means of drying the straw bedding before issue is recommended. The fuel allowance is also said to be insufficient in winter. The married quarters are modern and good. The water supply from wells is fairly good in winter, but in summer indifferent.

At *Sligo* no insanitary conditions have been noted, but there are no married quarters, and the families have to live in lodgings in the town.

Cork District.

The Principal Medical Officer (Surgeon-Colonel W. E. Riordan) reports that the health of the troops compares favourably with that of any year of the previous decennial period, and the invaliding rate shows a marked decrease. With regard to the remarkably high invaliding rate noted in 1896 in the garrison of the city of Cork as due to route marching, mention is made of an alteration in the system, by which "commanding officers were allowed more freedom of action in selecting days on which to conduct the marches, and given discretionary power to intermit or stop for a day the marches to be undertaken under regulations."

With regard to the prevalence of zymotic disease in the district, epidemics of measles occurred at Cork and Fermoy, and some isolated cases at Limerick, Cahir, Tipperary and Clonmel. At Cork and Fermoy the epidemics are attributed to infection from the civil population. At the former station there were as many as 39 admissions amongst the troops, 6 amongst the officers and 81 amongst the families. At Fermoy all the cases (85) occurred amongst the children. There was no marked outbreak of scarlet fever at any station, with the exception of 5 cases in a single family occupying lodgings in the town, at Limerick. At Kilkenny, Fermoy, Clonmel, Tipperary and Ballincollig there were also some isolated cases of scarlet fever, but the other stations were exempt.

There were 15 cases of enteric fever (13 amongst the troops, 1 amongst officers and 1 amongst the women). Nine of the cases occurred at Cork, 5 being amongst men of the Hampshire Regiment, immediately after their arrival from Birr, 1 was amongst the women, and no cause has been assigned for the remaining 3 cases. Another case amongst the men of the Hampshire Regiment occurred at Fermoy and is also attributed to Birr. The remaining cases amongst the men are 2 at Tipperary (1 attributed to the town and the other untraced) and 2 at Kilworth Camp, also untraced. The case among the officers was at Ballincollig, but nothing is noted to account for its occurrence.

As regards venereal disease, the Cork district shows the least prevalence of any district in the United Kingdom, the admission rate being as low as 77·8 per 1,000. Taking individual stations, however, it is found that at Waterford the rate amounted to 232·5 per 1,000, and at Cork, Ballincollig, Tipperary and Kilkenny to 144·9, 115·6, 110·7, and 101·1 respectively. At all other stations it was less than 100; Tralee with an average annual strength of 246 having a rate of 8·1, and Limerick with a strength of 673, one of 37·1 only.

The general sanitary condition of the various stations occupied by the troops throughout the district during the year 1897 may be said on the whole to have been satisfactory. One new station of minor importance was opened during the year in addition to those reported in 1896, viz., Bandon, which was used to relieve overcrowding of the 17th Lancers at Ballincollig. The following is a brief review of the sanitary state of the various barracks occupied by the troops.

At *Ballincollig*, the water supply was defective owing to the want of efficient filtration at the public waterworks, and this matter has been the subject of a correspondence with the local authorities. Action has been taken in this matter by the town commissioner, by employing the services of an expert sanitary engineer, with a view to having the filter beds thoroughly overhauled and relaid in a satisfactory manner. The ablution accommodation is somewhat defective. There are only 4 ablution rooms for the use of the troops (averaging 320) and these are situated somewhat

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below the general ground level, and are consequently somewhat dark and damp. A fifth ablution room is now in course of construction. Four baths are provided and are ample, but hot water is not laid on. There have been no improvements of an important character during the year.

At *Buttevant* the barracks are in good sanitary condition, and no zymotic disease occurred amongst the troops, although the sanitation of the village is of a most primitive character and diphtheria prevailed among the civil population both there and in the neighbouring village of Doneraile. The erection of a block of married quarters containing accommodation for 24 families with wash-house, drying ground, gardens, latrines, &c., was completed during the year and has caused great satisfaction.

At *Cahir*, water-closets of an improved modern pattern were provided to the officers' quarters, and a fixed bath with a laid on supply of hot and cold water has been erected in the ablution room of the hospital.

At *Clonmel*, since the introduction to barracks of the new municipal water supply last year, the sanitary condition of the barracks has been considered very good. During 1897 this water supply was laid on to all buildings in barracks, including the married quarters.

At *Cork* there is an insufficiency of accommodation for married families, and a site has been selected for the erection of a new block. The drainage system is open to some improvement as the drains are not properly provided with means of inspection. In the station hospital the water-closet fittings are obsolete, and sanction has been obtained for their reconstruction. The erection of a garrison bath-house with hot and cold water laid on has been recommended.

At *Fermoy* there is also a want of accommodation for married families, but only in the old barracks where the families have to be accommodated in vacant barrack-rooms. In the new barracks the accommodation is good. The provision of a moist heat disinfecting chamber and the erection of a separate building near the hospital for the treatment of infectious cases are much needed. Both these points are under consideration. During the year the drainage in the old barracks was reconstructed.

At *Kilkenny* a scheme has been approved for remodelling and reconstructing the drainage system of the barracks, the defective condition of which was brought to notice in last year's report. A suitable mortuary is needed at this station, and its provision is under consideration.

At *Kinsale* no new sanitary services were effected during the year, but recommendations were made with a view to improving the ventilation of the new gymnasium, and also to improve and increase the ventilation of the garrison provost cells. A proper mortuary is also required. Charles Fort, although said to be a very old building, is stated to be in a fairly good sanitary condition.

At *Limerick* hired government quarters were provided during the year to relieve the congested condition of the married accommodation in the Strand barracks. These quarters consist of 9 new cottages recently built, and they are stated to be conveniently situated and well constructed. The general sanitary condition of the station is satisfactory.

The various forts, &c., in *Cork Harbour* are said to be in a good sanitary state. There is still from time to time some trouble with the water supply, especially at Spike Island and Fort Camden. Strict supervision was maintained over the tanks with a view to preventing contamination, but the supply runs short at times and purchases have to be made locally. The Principal Medical Officer notes that this could be obviated, so far as concerns Fort Camden, by laying on a water supply from the village of Crosshaven, the pipes of which reach to within three-quarters of a mile from the fort. The whole drainage system in Haulbowline Island has been reconstructed during the year; as also that of the station hospital, Queenstown.

At *Templemore* the accommodation is sufficient for a battalion of infantry, but the barracks have only been occupied by small detachments to relieve overcrowding at other stations during the year. They are said to be on the whole in a good sanitary condition.

At *Tipperary* no new sanitary services were effected during the year, and the defects in the drainage system, which were noted in last year's report, still exist. The whole system is, however, about to be remodelled.

United Kingdom.

At *Tralee* a new grocery canteen with a large airy recreation room was constructed. The provision of a recruits' inspection room is recommended.

At *Waterford* nothing of importance has been noted.

At the other stations occupied by the troops for longer or shorter periods during the year, namely, *Bandon*, *Carrick-on-Suir*, *Clogheen*, *Duncannon Fort*, *Fethard*, and *Youghal*, the barracks were only occupied by small detachments and no important sanitary improvements or defects are noted except at Bandon and Youghal. At the former the well-water which supplied the barracks was found to be bad, and steps were taken to introduce the town supply into them, and similar action was also taken in the latter station.

Curragh District.

The general health of the troops is reported by the Senior Medical Officer (Brigade-Surgeon-Lieutenant-Colonel J. D. Edge, M.D.) to have been very good during the year. There were four cases of enteric fever, including one officer. All the cases were said to have been contracted outside the district, two being traced to Birr, one to London, and the case amongst the officers to Dublin. There were six cases of diphtheria (3 fatal) amongst the children in the Curragh Camp, and an epidemic of measles necessitating the closing of the schools there. A few cases only of scarlet fever occurred, 2 amongst the troops and 4 amongst the children at the Curragh, and 1 amongst the troops and 1 amongst the children at Newbridge, where the disease was prevalent amongst the civil population. An outbreak of diarrhœa is referred to as occurring amongst the children at Newbridge, and is attributed to the hot weather and to the insanitary condition in which the gullies at the married quarters were found. The prevalence of venereal disease in the district was considerable, the admission and constantly sick rates being 125·0 and 11·12 per 1,000 respectively. At the Curragh Camp the former rate was 129·3 and at Newbridge 105·4.

With regard to sanitary defects and improvements it is noted that at the *Curragh Camp* the barracks are undergoing reconstruction. The troops in the right wing are quartered in old wooden huts, and the latrines, except at the hospital, where there are waterclosets, are old and constantly needing repair. The water supply is pure though very hard, and is apt to fail during drought. In the left wing the new barracks are being completed and a portion of the new cavalry barracks, which are almost finished, was occupied by two squadrons during the year. The old huts are unsatisfactory, but very few are in occupation. The brick buildings occupied by the married soldiers are good, but the huts are said to be overcrowded. Some of the new quarters for families were completed and occupied during the year.

At *Newbridge* the inadequacy of the surface drainage of the roads is again alluded to, but otherwise the sanitary conditions are considered satisfactory. The married quarters are insufficient, and some families are on the lodging list in the town of Newbridge, which is described as very insanitary.

III.—ON THE HEALTH OF THE TROOPS SERVING IN GIBRALTAR.

SICKNESS AND MORTALITY.

Gibraltar.

The average strength of the warrant officers, non-commissioned officers and men serving in the Command during the year was 4,726.

The troops stationed in Gibraltar throughout the year were No. 23 Company of the Eastern Division and Nos. 2 and 36 Companies of the Southern Division, Royal Artillery; 4 Companies of the Royal Engineers; the 1st Battalion Northumberland Fusiliers; and detachments of the Army Service Corps, Medical Staff Corps, Army Ordnance Corps, and Garrison Staff.

The arrivals during the year consisted of No. 19 Company Eastern Division Royal Artillery in January, No. 11 Company in September, and Nos. 18 and 20 in November, the 1st Battalion Grenadier Guards in October, and the 1st Battalion Manchester Regiment in November, all coming from the United Kingdom. A draft from the 2nd Battalion Northumberland Fusiliers joined the 1st Battalion at the end of January, from Singapore.

Of the Eastern Division Royal Artillery, No. 14 Company left for home on January 1st, and Nos. 15, 21 and 22 in December, while the 1st Battalion Cameron Highlanders left for Egypt in October, and the 1st Battalion South Wales Borderers for India in November.

The following table shows the admission, mortality and invaliding rates, etc., among the troops forming the garrison :—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
4,726	3,888	18	2	20	123	60	263·75	822·7	4·23	26·03	12·69	55·81

In comparison with the previous year the admission, death, and constantly sick rates have increased by 123·2, ·13, and 2·52 per 1,000 respectively, and in comparison with the average ratios for the ten years 1887–96, by 113·9, ·22, and 9·16.

The average sick time to each soldier was 20·37 days, which is longer than in 1896 by ·87 of a day and than the decennial average period by 3·35 days. The average duration of each case of sickness, 24·76 days, is shorter than in the previous year by 3·12 days, but longer than the average period by three-quarters of a day.

In Abstract XXVI is a table showing these health statistics for the several regiments and corps which served at Gibraltar during the year. In the Royal Artillery (excluding those companies which were less than three months in the Command) the highest admission rate, 1,254·8 per 1,000, was in No. 36

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Company, Southern Division, and the lowest, 693·7 per 1,000, in No. 23 Company, Eastern Division. The highest rate of constant inefficiency through sickness was 82·40 per 1,000 in No. 2 Company, Southern Division, and the lowest, 43·57, in No. 21 Company, Eastern Division; the ratios of admission and constantly sick for the Royal Artillery as a whole were 829·4 and 54·83 per 1,000. In the Royal Engineers the corresponding ratios were 413·1 and 26·08, in the 1st Battalion Grenadier Guards, 1431·0 and 58·97, and in the Infantry 856·4 and 62·64 per 1,000 respectively. Excluding the 1st Battalion Manchester Regiment, which arrived from England in November, the highest admission and constantly sick ratios in any battalion of infantry of the line were 979·6 and 74·75 per 1,000 in the 1st Northumberland Fusiliers, and the lowest, 624·6 and 45·91, in the 1st Cameron Highlanders; these battalions also furnished the highest and lowest admission rates respectively in the previous year.

With reference to the influence of age on the sickness and mortality, among men under 20 years of age the admission ratio was 983·1 per 1,000, rising to 1069·5 among those between 20 and 25 years, but falling to 534·9 among men between 25 and 30, and to 384·4 among men of 30 years of age and upwards, the sequence being similar to that observed in the two preceding years. There were 2 deaths, or 5·63 per 1,000, among men under 20 years of age, 5 deaths, or 2·11 per 1,000, among men between 20 and 25, 6 deaths, or 3·88 per 1,000, among men between 25 and 30, and 5, or 11·11 per 1,000, among men of 30 years of age or more. The corresponding ratios in 1896 were 3·21, 3·37, 3·23, and 7·52 respectively. As to service in the Command, the admission ratio was highest, 1016·5 per 1,000, among men in their first year, falling to 856·7 and 667·1 respectively among those in their second and third years, and to 474·6 among men who had been more than three years in the Command. In 1896 the sequence was somewhat similar, but the lowest ratio was that of men in their third year. There were 7 deaths, or 3·30 per 1,000, among men in their first year, 5 deaths, or 5·64, among those in their second, 3 deaths, or 3·70, among those in their third year, and 3 deaths, or 3·31 per 1,000, among men who had more than three years in the Command. The corresponding ratios for the previous year were 5·31, 3·01, 2·75, and 3·49 respectively.

In Abstract No. II is a table showing the principal statistics of sickness and mortality arranged according to the various sections of disease.

General Diseases.—*Eruptive fevers* were represented by four cases of scarlet fever and three of measles. Three of the cases of scarlet fever were in men of the Grenadier Guards, and the disease is believed to have been contracted prior to embarkation.

There were 16 admissions for *enteric fever*, with 5 deaths, one of the latter occurring in an invalid who had left the Command. The admission rate for enteric fever was 3·4 per 1,000, which is exactly double that of the previous year, though lower than the average rate for the previous ten years by 2·6. The death rate, 1·06 per 1,000, is higher in the two comparisons by ·63 and ·02 respectively. The percentage of mortality to attack was 31·2, as compared with 25·0 in 1896 and 17·7, the average percentage for the previous ten years. Five of the patients had been quartered during the period preceding admission to hospital in the North Front, two each in the Grand Casemates and the non-dieted hospital, Town Range, and one each in South Barracks, Poca Roca, Orange Bastion, Catalan Bay, Wellington Front, Buena Vista, the civilian quarters at back of Hargrave's Barracks, St. Jago's and the Station Hospital. The Principal Medical Officer remarks that it is obvious from the scattered distribution of this disease that it was not due to any common local cause, and that with the exception of the cases from Town Range, where the drainage (since relaid) was unsatisfactory, the origin of the disease was obscure, although probably due to the consumption of some infected articles of food or drink bought in the town of Gibraltar. Eleven of the 16 cases occurred in men between 20 and 25 years of age, and one-half of the patients were in their first year of service in the Command.

The admissions occurred in the following months :—

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January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
2	1	—	1	4	3	1	—	1	—	3	—	16

Under the heading of *other continued fevers* 67 admissions are returned, comprising 48 for simple continued fever, and 19 for Mediterranean fever, and there was one death from the last named disease. The admission ratio was 14·2 per 1,000, which is greater than that of the preceding year by 3·0, but less than the decennial average rate by 8·7.

For *malarial fevers* there were 132 admissions, all for ague, mostly occurring in men of the 1st Northumberland Fusiliers, who had served in India and China. The ratio was 27·9 per 1,000, which is greater than that for 1896 by 13·4, and than the average rate for the preceding ten years by 23·4.

The single admission under the heading of *septic diseases* was caused by a case of erysipelas.

Tubercular Diseases.—There were 14 admissions and 3 deaths, the latter including that of an invalid, tubercle of the lung causing 10 of the admissions and all the deaths. The ratio of prevalence was 3·0 per 1,000, as compared with 1·7 in the previous year, and 2·0 the average rate.

Venereal Diseases.—*Primary syphilis* was the cause of 90 admissions, or 19·0 per 1,000, as compared with 5·8 in 1896. If to this be added the sickness from soft chancre, for which there were 517 admissions and 45·76 men constantly sick, the total admission ratio for primary venereal sores equalled 128·4 per 1,000, which is higher than that in the previous year by 57·3 and than the average for the preceding ten years by 19·5. *Secondary syphilis* with 147 admissions gave a ratio of 31·1 per 1,000, as compared with 21·0 in 1896 and 26·0, the average for the decennial period. It is noted that some of the cases were exceptionally severe in men of the 1st Northumberland Fusiliers, who contracted the disease at Singapore. *Gonorrhœa* caused 582 admissions, equal to a ratio of 123·2 per 1,000, which is less than the previous year's rate by 18·3, but greater than the average by 1·1. Taking all these forms of venereal disease together, the total admission rate for venereal diseases was 282·7 per 1,000, which is above that for 1896 and the average rate by 49·1 and 25·7 respectively. The total ratio of constant inefficiency on account of these diseases was 26·07 per 1,000, which is in excess of the previous year's rate by ·38 and of the decennial average ratio by 4·11.*

Parasitic Diseases.—36 admissions are returned, comprising 5 cases of tænia solium, 28 of scabies, 2 of ringworm, and 1 of phthiriasis. In previous years, the three last named affections were included under the heading of skin diseases.

For *alcoholism* there were 42 admissions, including 4 for delirium tremens, the ratio, 8·9 per 1,000, being higher than in 1896 by 2·4, and than the average rate by 3·9.

Rheumatism.—There were 188 cases, including one of rheumatic fever, the equivalent ratio being 39·8 per 1,000, which is above that for the previous year by 19·5 and the average rate for the ten years 1887–96 by 12·6.

Debility caused 26 admissions, the equivalent ratio, 5·5 per 1,000, being greater than the previous year's rate by 1·0, and than the average ratio by 1·4.

Under the heading *other general diseases*, 50 admissions are returned including 44 for non-malignant new growth, 4 for anæmia, and 1 each for diabetes mellitus and congenital malformation.

LOCAL DISEASES.—*Diseases of the Nervous System.*—There were 42 admissions, including 7 for mental affections, the ratio being equal to 8·9 per 1,000,

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* There were no admissions for ulcer of penis of non-venereal origin.

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as compared with 15·3 in the previous year and 9·3, the decennial average rate. The cases comprised 21 of facial neuralgia, 5 of paralysis, 4 each of epilepsy and melancholia, 2 of nervous weakness, 2 of mania, and 1 each of inflammation of spinal cord, vertigo, hiccough and dementia. There was no death.

Diseases of the Eye with 45 cases gave an admission rate of 9·5 per 1,000, which is greater than the previous year's rate by 1·3, but less than the average by ·9. Conjunctivitis furnished 29 of the admissions, and there were 5 each for keratitis and iritis.

Diseases of other Organs of Special Sense caused 62 admissions, or a ratio of 13·1 per 1,000, which is greater than that for the previous year by 2·9 and than the average rate by 4·3. The cases included 47 of inflammation of the external meatus and 7 of deafness.

For *diseases of the circulatory system* there were 29 admissions, the ratio being 6·1 per 1,000, which is higher than in 1896 by 2·4 and than the average rate by 2·5. Disordered action of the heart furnished 18 cases. valvular disease 7, and varix 4. No death occurred.

Diseases of the Respiratory System.—111 admissions are recorded, the equivalent ratio being 23·5 per 1,000, as compared with 20·0 in the previous year, and with 26·6, the average for the preceding ten years. Bronchial affections accounted for 87 of the cases, and there were 9 admissions each for pneumonia and pleurisy. Five deaths occurred, 4 being due to pneumonia and 1 to congestion of lung.

Diseases of the Digestive System caused 457 admissions, or a ratio of 96·7 per 1,000, which is higher than the previous year's and average rates by 3·2 and 9·1 respectively. Among the cases treated were 181 affections of the mouth and throat, 113 cases of dyspepsia, 56 of diarrhœa, 45 of colic, and 19 of hepatic disorder. There was one death from internal strangulation of intestines.

Diseases of the Lymphatic System.—There were 121 admissions, or 25·6 per 1,000, which is an increase of 9·8 on the previous year's rate and of 13·1 on the average. All but two of the cases were due to inflammation or suppuration of the lymphatic glands.

Diseases of the Urinary System caused 17 admissions, giving a ratio of 3·6 per 1,000, which is higher than the previous year's and the average rates by 1·7 and 1·9 respectively. Incontinence of urine caused 12 of the admissions, and there were 3 cases of cystitis, of which one proved fatal.

Diseases of the Generative System with 572 admissions, gave a ratio of 121·0 per 1,000, as compared with 76·5 in the previous year and 99·7, the decennial average rate. These admissions include the 517 cases of soft chancre referred to under the heading of venereal diseases, and there were among the remaining admissions 31 cases of orchitis, 9 of balanitis, and 6 of hydrocele. There was no admission for ulcer of penis.

Diseases of the Organs of Locomotion.—There were 48 admissions, equal to a ratio of 10·2 per 1,000, which is above both the previous year's and the average rate by 4·1. Synovitis was the most frequent cause of admission (30 cases), and there were 7 cases of inflamed bursa and 5 of flat foot among the remainder.

Diseases of the Connective Tissue caused 178 admissions, or a ratio of 37·7 per 1,000, which is higher than that for 1896 by 17·8 and than the average rate by 17·7. Of the cases 104 were due to inflammation and 74 to abscess.

Diseases of the Skin, with 235 admissions, gave a ratio of 49·7 per 1,000. The cases were mostly due to boils, eczema, ulcers and whitlows.

INJURIES.—For *general injury* there were 4 admissions, all returned as multiple injury. There was one death from accidental drowning in the case of a non-commissioned officer who was taking part in a diving competition. For *local injuries* there were were 555 admissions, the total ratio for injuries being 118·2 per 1,000, which is fractionally higher than that recorded for 1896, and 15·4 above the average of the ten years 1887–96. There were 211 cases of wounds, 127 of sprain, 115 of contusion and 71 of abrasion, among the remainder being 12 of fracture and 11 of burns and scalds. There were three deaths all cases of suicide, cut-throat being the method in one and gun-shot in the other two. A verdict of "temporary insanity" was recorded in each instance. In no case could a motive be assigned for the act.

INVALIDING.—The number of invalids sent home during the year was 123, the equivalent ratio being 26·03 per 1,000, which is above the previous year's and the average rates by 19·55 and 10·70 respectively. This large increase is partly accounted for by the fact, mentioned in the Army Medical Department Report for 1896, that 20 invalids who should have gone home in that year did not do so, in consequence of no transport being available, and also by the fact that the draft of the 2nd Northumberland Fusiliers which joined the 1st Battalion at the end of January from Singapore brought many cases with them, who were invalided shortly afterwards.

Among individual corps, excluding those only a short time in the Command, the highest rate of invaliding was 37·97 per 1,000 in No. 2 Company, Southern Division, Royal Artillery, the next highest being 37·04 in No. 15 Company, Eastern Division. No man was sent home from No. 19 Company, Eastern Division, Royal Artillery, and next to this, the lowest rates were 12·99 per 1,000 in No. 21 Company, Eastern Division, Royal Artillery, and 14·01 in the 1st Cameron Highlanders. The rate in the Royal Engineers was 18·42 per 1,000. As to the ages of the men invalided, 6, or 16·90 per 1,000, were under 20 years, 68, or 28·66 per 1,000, were between 20 and 25, 30, or 19·38 were between 25 and 30, and 19, or 42·22 per 1,000, were 30 years of age or over, the corresponding ratios in 1896 being 9·62, 5·91, 5·81, and 10·03 respectively. With regard to invaliding according to length of service in the Command, 49 men, or 23·08 per 1,000, were in their first year, 37, or 41·76, in their second, 23, or 28·36 were in their third year, and 14 men, or 15·45 per 1,000, had been more than three years in the command. In the previous year no man was invalided with less than one year's service, and the ratios for men in their second and third years were 1·51 and 13·74 per 1,000, that for men of longer service being 19·21. The principal causes of invaliding were nervous diseases, 26 cases, or 5·50 per 1,000 (including 18 cases, or 3·81 per 1,000 of mental disorders), secondary syphilis, 15 cases, or 3·17 per 1,000, diseases of the lymphatic system, 13 cases, or 2·75 per 1,000; rheumatism, 12 cases, or 2·54 per 1,000; tubercular diseases, 9, or 1·90 per 1000, of which 5 were cases of tubercle of the lung, and diseases of the digestive system, 7 cases, or 1·48 per 1,000.

The number of men finally discharged the service as medically unfit was 60, equal to a ratio of 12·69 per 1,000, which is higher than that in 1896 by 8·59, and than the average rate for the preceding ten years by 4·44. The chief causes of discharge were nervous disorders, 18 cases, or 3·81 per 1,000 (including 13 cases, or 2·75 per 1,000 of mental affection), tubercular diseases, 9, or 1·90 per 1,000, 5 of the cases being due to lung affection, and secondary syphilis and diseases of the digestive and lymphatic systems, each 6 cases, or 1·27 per 1,000.

OFFICERS.—In an average strength of 140, there were 66 cases of sickness, the ratio of admission being 471·4 per 1,000 as compared with 514·5 in 1896. One officer died from fracture of the base of the skull, the result of an accident at polo. There were 7 officers invalided, viz.:—3 for Mediterranean fever, 2 for concussion of the brain, and 1 each for synovitis and inflamed bursa. Among the cases treated were 7 of Mediterranean and 6 of simple continued fever, 4 of ague, 3 each of bronchitis, diarrhœa, orchitis, and hepatic disorders, and there were 14 cases of injury. No case of enteric fever occurred amongst the officers during the year.

WOMEN.—The average strength was 273, and there were 141 cases of sickness and 2 deaths. The ratio of sickness was 516·5 and that of mortality 7·33 per 1,000, as against 662·9 and 3·79 in the previous year. The chief causes of sickness were bronchitis, 12 cases, simple continued fever 10, debility 10, Mediterranean fever and neuralgia, 9 each, and there were 31 cases of diseases peculiar to women. There was one admission for diphtheria. One of the deaths was due to tubercle of the lung and the other to phthisis.

Gibraltar.

CHILDREN.—The average strength was 490. There were 321 cases of sickness and 15 deaths. The admission and mortality rates were 655·1 and 30·61 per 1,000 respectively, the former being lower by 114·3 and the latter higher by 11·23 than the corresponding ratios for 1896. Bronchial affections again furnished the largest number of cases, 63, and among the remainder were 23 of diarrhœa, 17 of mumps, 16 of disorders of dentition, 15 of simple continued and 12 of Mediterranean fever, 14 of measles and 7 of scarlet fever, 12 of debility, 11 of diphtheria, and 10 of whooping cough. Of the deaths, 4 were due to enteritis, 2 each to diphtheria and spina bifida, and one each to debility, immaturity at birth, dysentery, pneumonia, disorders of dentition, inflammation of stomach, and diarrhœa. Some of the cases of diphtheria are attributed to defective drains.

Vaccination.—There were no instances of arm-to-arm vaccination. Of 6 primary vaccinations with preserved lymph amongst the men 5 were successful, as were 70 out of a total of 99 amongst the children. There were 49 re-vaccinations amongst the men, 8 amongst the women, and 10 amongst the children, with successful results in 28, 4, and 5 cases respectively.

SANITARY CONDITIONS.

During the year the new drainage system, having its outfall at Europa, approached completion. The Principal Medical Officer (Surgeon-Colonel W. A. Catherwood, M.D.) reports that the defects of the existing system required constant supervision and repair. He also notes that "venereal disease is extremely prevalent," and adds that "most certainly the present uncontrolled license to spread this form of disease among the Garrison ought to be checked." No change is noted in the clothing or duties of the troops, and the existing conditions have been generally considered favourable to health. Frozen beef was tried experimentally but abandoned. Frozen mutton continued to be issued twice weekly.

In No. 1 District, North Front and Catalan Bay, some of the principal defects noted in the previous year's report were remedied. The soil under the officers' and married quarters was covered with concrete and several surface drains and floors renewed. The Commanding Officer's quarter is still noted as damp and not raised above the soil, and surface drains are required in connection with the officers' mess, canteen, cookhouse, and sergeants' mess kitchen. In No. 2 District it is noted that the arrangements for the introduction of electric lighting into the Grand Casemates barrack rooms are almost completed; that the flooring of many of the barrack rooms were renewed; and that the grocery bar has been removed from the canteen to the coffee bar and other minor improvements effected. The chief requirement in connection with these barracks is the concreting of the yard at the back. The tank under the school and sergeants' mess was found seriously polluted towards the latter part of the year. Orange Bastion was unoccupied during the year while the drainage was being remodelled and the barrack yard concreted. In No. 4 District the principal improvements noted are the occupation of a new hut on Middle Hill by the R.E.; the vacating of the hired married quarters in Bado's buildings, and the reconstruction of the drainage in officers' quarters in Castle Road and Paradise Cottage. In No. 5 District, the ground floor married quarters in King's Bastion were vacated on sanitary grounds; as also Town Range (north) used as a non-dieted hospital, pending reconstruction of drainage and other improvements. The drains and floors in the south barrack, Town Range, were renewed during the year. In No. 6 District, the tailor's shop, noted last year as defectively ventilated, has been reconstructed and enlarged; and the drain in St. Jago's barracks relaid. In No. 7 District, the old latrines of the South Barracks have been removed and three new latrines erected; the drainage has been remodelled, old stores taken down and several minor improvements carried out. A new canteen has been constructed in connection with North Jumper's Bastion, and the old waterclosets removed and replaced by earth closets. The drainage of the married quarters in Rodger's Road has been remodelled and part of the yard concreted. Two new blocks of married quarters were occupied at Rosia and near the naval hospital, and married families were also placed in the new Dagninos' buildings, the old hired buildings (Abrines' buildings) being vacated. In No. 8 District a considerable number of the drains, connected with the Windmill Hill barracks (old block) Officers' quarters and other buildings at Windmill Hill and Buena Vista, were reconstructed, but some old drains still remain, especially at Windmill Hill, in an unsatisfactory and dangerous condition. In No. 9 District a new building containing dry canteen, stewards' quarters, coffee bar, supper room, reading room, library and billiard room, has been opened at Europa Huts, and the wet canteen is being reconstructed. In this district many of the old drains were removed and new drainage constructed, notably in the Brewery Barracks, which were vacated in July for the purpose, and in the married quarters there. The Europa main drain was found blocked and partly relaid, and several minor improvements were effected. The sanitary requirements noted in this district are the relaying of the remainder of the Europa main drain, the concreting of surface drains, and the provision of a new sergeants' mess and new medical inspection room.

In connection with the Station Hospital it is noted that no steps have yet been taken to increase the water closet and latrine accommodation, and that extra baths and means of ablution are also needed. The kitchen space is noted as being too limited. During the year, the hospital accommodation had to be supplemented by marquees and bell tents and a ward of 24 beds lent from the naval side of the hospital. The non-dieted hospital in Town Range was vacated towards the end of October, on account of the reconstruction of drainage, and transferred to the North Front, where three of the huts were converted into a hospital, the existing non-dieted hospital there being used as office and stores and the ablution room of the barracks divided, one-half for the patients and the other half for the troops.

During the year a considerable amount of assistance has been given in diagnosing cases of sickness by the bacteriological laboratory of the Sanitary Commissioners. In all, 16 specimens of throat "swabs," 15 of sputum, 4 of urine and 1 of blood, were sent to the laboratory for examination, and the serum diagnosis test was applied in 28 cases of fever. A milk sterilizer was supplied to and used in the Station Hospital during the year.

IV.—ON THE HEALTH OF THE TROOPS SERVING IN THE MALTA COMMAND.

Sickness and Mortality.

I.—British Troops.

alta.

The average strength of the troops serving in the Malta Command (excluding the Royal Malta Artillery) was 9,175, which number includes the force detached for service in Crete, the average annual strength of which was 1,152.

The units serving throughout the whole year were, Nos. 5 and 17 Companies, Eastern Division, and 16, 26, 29 and 30 Companies, Southern Division, Royal Artillery, three companies of the Royal Engineers, the 2nd Battalion Royal Welsh Fusiliers and the 1st Battalions of the West Riding Regiment and Highland Light Infantry, with detachments of the Army Service, Medical Staff, Army Ordnance, and Army Pay Corps and Garrison Staff.

The arrivals were No. 4 Mountain Battery in April and Nos. 17 and 19 Companies, Southern Division, R.A., in October, the 2nd Battalion Dorsetshire Regiment in January, the 1st Battalion Seaforth Highlanders in February, the 1st Battalion Suffolk Regiment in April, the 2nd Battalion Rifle Brigade in October, and the 1st Battalion Border Regiment in November, all from England, and a detachment of the 2nd Battalion Manchester Regiment in December, from India.

The troops leaving the Command were No. 8 Company, Southern Division, Royal Artillery, to Bermuda, and No. 22 Company of the same division to Jamaica, both in October, the 1st Battalion Royal Warwickshire Regiment, to Egypt, in January, the 1st Battalion Lincolnshire Regiment, to Egypt, in February, the 2nd Battalion Worcestershire Regiment, to Bermuda, in October, and the 1st Battalion Royal Lancaster Regiment, to Hong Kong, in November.

The troops stationed in Crete were the major portion of the 1st Seaforth Highlanders, which, with detachments of the Army Service, Medical Staff, and other corps, landed on the 24th March, followed by No. 4 Mountain Battery, Royal Artillery, a detachment of the Royal Engineers, and the 2nd Battalion Royal Welsh Fusiliers, in April, the Mountain Battery and the Highlanders leaving the island in November. Kandia and Canea were the stations occupied by British troops.

In the following table are shown the admission, mortality, invaliding rates, etc., among the troops in the whole Command, and also separate statistics for those serving in Crete.

1897	Average Strength.	Admissions.	Deaths.			Invalids.	
			In the Command.	Of Invalids.	Total.	Sent Home.	Finally discharged.
Malta and Gozo	8,023	6,397	64	9	97	258	88
Crete	1,152	1 683	24				
Total ..	9,175	8,080	88	9	97	258	88

(*continued*)

(*continued*)

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1897.	Average constantly Sick.	Ratio per 1,000 of Strength.				
		Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.
Malta and Gozo.. ..	443·10	797·3	10·57	28·12	9·59	55·23
Crete	44·41	1460·9				38·55
Total ..	487·51	880·6	10·57	28·12	9·59	53·13

Comparing the statistics for the whole Command with those of the previous year and with the average of the preceding ten years, the admission rate has increased by 86·7 and 213·7, the death rate by 2·64 and 3·04, and the constantly sick rate by 1·00 and 8·84 per 1,000 respectively.

The average sick time to each soldier was 19·39 days, which is longer than in 1896 by ·31 of a day, and than the decennial average period by 3·22 days. The average duration of each case of sickness, 22·02 days, is shorter in the two comparisons by 2·01 and 2·23 days respectively.

In Abstract XXVI is a table showing these health statistics for the several regiments and corps which served in the Command during the year. In the Artillery, the admission, mortality and constantly sick rates, were 638·5, 10·65 and 37·34, as compared with 554·9, 7·70 and 40·53, in 1896. Excluding the two companies which arrived in October, the highest admission rate was 1120·0 in No. 4 Mountain Battery, at Crete from April until November and then at Verdala Barracks until the close of the year. The next highest rate was 756·2 in No. 30 Company, Southern Division, at St. Elmo and St. James Cavalier. The lowest ratio was 456·0 in No. 5 Company, Eastern Division, at St. Elmo, the next lowest being 474·4 in No. 22 Company, Southern Division, at Fort Ricasoli until embarkation for Jamaica in October. The constantly sick rate was highest, 52·25 per 1,000, in No. 30 Company, Southern Division, the next highest being 49·36 in No. 4 Mountain Battery. The lowest rates were 22·12 in No. 22 Company, and 28·83 in No. 16 Company, Southern Division, the latter being quartered at Fort Ricasoli. In the Infantry the admission rate was 968·6, the death rate 10·41, and the constantly sick rate 58·61 per 1,000, as compared with 882·9, 8·10 and 57·35 per 1,000, in 1896. Among battalions of an annual average strength of over 100 men, the highest admission rate was 1,603·4 per 1,000 in the 1st Battalion Seaforth Highlanders, which arrived from England in February, and was stationed for eight months in Crete, the next highest being 1127·9 in the 2nd Battalion Royal Welsh Fusiliers, in the Verdala District for seven months and then at Crete. The lowest ratio was 728·1 in the 1st Battalion Border Regiment, stationed at Imtarfa, after arrival from England in November, the next lowest being 772·2 in the 2nd Battalion Worcestershire Regiment, at Pembroke Camp until departure for Bermuda in October. The highest death rate was 20·69 per 1,000, in the 1st Battalion Seaforth Highlanders, and the next highest 16·49, in the 1st Battalion Suffolk Regiment, which arrived from England in April, and was quartered for six and a-half months at Imtarfa and for 2 months in the Isola District. There was no mortality in the 1st Battalion Border Regiment, nor in the 2nd Battalion Rifle Brigade, which arrived from England in October, and was located in the Verdala District. In the 1st Battalion Highland Light Infantry, at Manoel Forts and Huts, the mortality rate was 4·34, and in the 2nd Battalion Worcestershire Regiment, 5·30 per 1,000. The highest rate of constant inefficiency was 73·64 per 1,000, in the 1st Battalion Seaforth Highlanders, followed by 68·32 in the 1st Battalion West Riding Regiment, at Floriana and Notre Dame, the two lowest ratios being 34·56 in the

Malta. 1st Battalion Border Regiment, and 41·33 in the 2nd Battalion Rifle Brigade.

With reference to the influence of age on the sickness and mortality, it is observed that the admission rate was 817·3 per 1,000 among men under 20 years of age, rising to 1,045·8 among men between 20 and 25, then falling to 655·4 among those between 25 and 30, and to 444·3 among men of 30 years of age and upwards, a sequence of ratios which has occurred for several years. The death rates at the various age periods named were 7·81, 8·57, 12·49 and 11·73 per 1,000 respectively; in the preceding year the highest death rate was among men of 30 years of age and upwards, and the lowest among those between 25 and 30 years.

With regard to service in the Command, the admission rate was highest, 1,002·3 per 1,000, among men in their third year, the next highest being that of men in their first year, 943·1, followed by 832·6 among men in their second year, 479·2 among those who had been more than four years in residence, and 430·8 among men in their fourth year of service in the Command. In the previous year the highest ratio was that of men in their first year, and the rates diminished steadily throughout the successive periods, the lowest being among the men who had been longest in the Command. The ratio of mortality was highest, 15·09 per 1,000, among men who had been more than four years in the Command, followed by 10·91 among men in their first, 10·40 among those in their third, 7·71 among those in their second, and 5·13 among men in their fourth year. In the previous year the highest death rate was among men in their second year, and the lowest among those who had been more than four years in the Command.

In Abstract III will be found the statistics of sickness, mortality, etc., arranged according to the different sections of disease.

General Diseases.—Four admissions are recorded for *small-pox*, all of which occurred in Crete, where an epidemic was prevailing. All were of a mild description and modified type. In two of the cases vaccination had been performed immediately before the onset, and perfect vaccine vesicles and typical variolous eruption were present at the same time. The admissions for *other eruptive fevers* were 15 in number, and comprised 11 for scarlet fever, 2 for measles, and 1 each for rubella and cow-pox. There was a single case of *influenza*.

Enteric Fever.—There were 73 admissions and 32 deaths, of which 34 admissions and 15 deaths were in Malta and 39 cases and 17 deaths amongst the troops serving in Crete. The admission ratio, 8·0 per 1,000, is higher than that for 1896 by 2·1 and than the average rate for the preceding ten years by 1·8, the mortality ratio, 3·49 per 1,000, being also higher in each comparison by 1·08 and 1·26 respectively.

But when the statistics relating to Crete are excluded, it is found that the admission rate for Malta and Gozo was 4·2 per 1,000, as compared with 5·9 in the previous year and with 6·2, the decennial average rate, while the death rate was 1·88 per 1,000, as against 2·41 and 2·23 in the above comparisons. The admission and mortality rates for Crete alone were 33·8 and 14·75 per 1,000 respectively.

The percentage of mortality to attacks was 43·8, as compared with 40·8 in 1896 and with 36·2, the average percentage for the preceding ten years. Of the men attacked 10 were under 20 years of age, 7 were in their 21st year, 16 in their 22nd, 6 in their 23rd, 6 in their 24th, and 28 were 24 years of age and upwards. As to total service, 2 of the men were in their first year, 11 in their second, 18 in their third, 12 in their fourth, 9 in their fifth, and 21 had more than five years' service; 42 had been less than one year in the Command, 24 were in their second year, 4 in their third, and 3 had been more than three years in residence. Nine cases occurred during the first quarter of the year, 11 during the second, 27 during the third, and 26 during the fourth quarter. Of the 34 cases which occurred in Malta, 6 were admitted from Imtarfa (one in September, three in October, and two in November), 5 were admitted from San Francisco Barracks, two of whom probably contracted the disease at Imtarfa, 2 cases occurred in men who disembarked from the transport "Dunera" a few days prior to admission, and the remainder were widely distributed and could not be traced to any

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particular cause. The outbreak at Imtarfa and the cases in Crete are specially referred to in the notes on the sanitary condition of those places.

Other continued fevers were the cause of 2,482 admissions and 13 deaths, the latter including that of an invalid. The admission rate was 270·5 per 1,000, which is higher than that for 1896 by 81·5, and than the average rate by 144·9; the death rate, 1·42 per 1,000, is lower than that for the previous year by ·38 but higher than the decennial average rate by ·19. Mediterranean fever accounted for 422 of the cases and for the whole of the deaths, this being the first year in which Mediterranean fever has been introduced into the nomenclature as a distinct disease. The remaining 2,060 admissions were shown as simple continued fever. 785 of the cases of simple continued fever and 143 of the cases of Mediterranean fever, with one death, occurred in Crete. Some cases of the latter were of a very severe and protracted type, and were followed by the usual rheumatic complications.

The medical officer in charge of Cottonera hospital states that the cases of simple continued fever were principally among young soldiers recently arrived from England, or among men during their first summer in Malta. He notes two types, 1st, with high temperature for two or three days and rapid recovery, evidently caused by exposure to the sun or climatic conditions, and 2nd, a more prolonged type of fever, a temperature running up to about 102° F, continuing for some seven or ten days, and then a gradual recovery. "It is often difficult to differentiate," he writes, "a mild case of enteric or Mediterranean fever from simple continued fever. By far the larger number of cases (of the second type) are undoubtedly caused by the unsuitable barracks and the insanitary surroundings in which the soldier lives." "Both Mediterranean and simple continued fevers were most prevalent during the months of August and September." "As regards fevers generally, there was a tendency to hyperpyrexia, and in all the fatal cases this was a prominent symptom."

Dysentery caused 173 admissions and 9 deaths, equal to ratios of 18·9 and ·98 per 1,000. The admission rate is higher than that for the previous year by 13·6, and than the average rate for the preceding ten years by 14·8. There was no death from dysentery in 1896. Nearly all the admissions, namely 135, and 7 out of the 9 deaths, occurred in Crete.

It is stated that many of the cases were severe and protracted. It is remarked that the ipecacuanha treatment often had no influence on the disease, but that, with the more severe and protracted cases, excellent results followed the administration of large warm enemata, each containing 30 grains of sulphate of quinine. These enemata were varied from time to time with others containing permanganate of potash. This treatment was markedly successful, only 4 deaths occurring out of 116 cases treated at Kandia.

Malarial Fevers.—There were 158 admissions, of which 156 were returned as ague and 2 as remittent fever, 89 of the former occurring in Crete. The admission ratio, 17·2 per 1,000, is below that for the preceding year by 4·3, but above the average rate by exactly the same amount. There was no death. A number of the cases were relapses in men who had contracted the disease in India or elsewhere, but many of the Crete cases depended upon local causes.

For *septic diseases* there were 6 admissions, including 5 for erysipelas and 1 for pyæmia, the latter ending fatally.

Tubercular Diseases caused 15 admissions and 8 deaths, 5 of the latter occurring in invalids who had left the command. The admission rate was 1·6 per 1,000, which is higher than in 1896 by ·6, but lower than the average rate for the preceding ten years by ·9. The death rate was ·87 per 1,000, being higher in the two comparisons by ·27 and ·04 respectively. Tubercular disease of the lungs caused 12 of the admissions and all the deaths.

Venereal Diseases.—There were 392 admissions for *primary syphilis*, or a ratio of 42·7 per 1,000, which is below the previous year's rate by 4·7, but above the average rate by 21·4. If to this be added the sickness from soft chancre, for which there were 89 admissions and 6·69 men constantly sick, the total admission ratio for primary venereal sores equalled 52·4 per 1,000, as compared with 60·1 in 1896 and 45·1, the decennial average rate. The constantly sick rate was 4·79 per 1,000, as against 5·73 and 4·17 in the two lta. comparisons. *Secondary syphilis* caused 220 admissions, equal to a ratio of 24·0, which is higher than that for the previous year by 7·8 and than the average rate by 8·6. The constantly sick rate, 2·46 per 1,000, was also higher in both comparisons, by ·57 and ·69 respectively. There was one death from this disease. *Gonorrhœa*, with 825 admissions, gave a ratio of 89·9 per 1,000, which is lower than that for 1896 by 7·5, but higher than the average rate by 18·0. The constantly sick rate was 7·53 per 1,000, being higher in the two comparisons by ·14 and 2·23.

Taking all forms together, the total admission ratio for venereal diseases was 166·3 per 1,000, which is lower than that for the previous year by 7·4, but higher than the average rate for the ten years 1887–96 by 33·9, while the constantly sick rate, 14·78 per 1,000, shows a decline of ·23 in the former comparison, but an increase of 3·54 in the latter.[*]

In the Cottonera Hospital district, the decrease in primary syphilis was marked, and the medical officer in charge of the hospital notes that "each case is now, if possible, traced to its source and steps taken by the police to prevent its spread." At the Valetta and Forrest Hospitals, however, it is observed that the men infected, as a rule, gave no help in this direction.

In Crete there were 13 admissions for primary syphilis, 7 for soft chancre, 22 for secondary syphilis, and 34 for gonorrhœa, the admission rate for primary venereal sores being 17·4 per 1,000, and for secondary syphilis and gonorrhœa 19·1 and 29·5 respectively. The total admission rate for all forms of venereal disease was 66·0 per 1,000, and there were 1·74 men constantly sick from these affections, the ratio being 1·51 per 1,000.

Parasitic Diseases caused 55 admissions, of which 39 were for scabies, 8 for ringworm, and 4 for tænia solium, the ratio, 6·0 per 1,000, being below the average by 6·4.

Alcoholism was the cause of 19 admissions and 1 death ; the admission ratio was 2·1 per 1,000, as compared with 1·2 in 1896, and 2·6, the average rate. No case of delirium tremens is recorded.

For *rheumatism* there were 197 admissions including 6 for rheumatic fever, the ratio being 21·5 per 1,000, which is below that for the previous year and the average rate by 2·6 in each instance. There was no especial prevalence in Crete.

Debility was the cause of 80 admissions, or a ratio of 8·7 per 1,000, which is above the previous year's rate by 4·1, but fractionally below the average. The admission ratio for Crete, alone, equalled 15·6 per 1,000, and the cases were mostly the result of attacks of fever.

Under the heading of *other general diseases* are included 61 cases of non-malignant and 1 of malignant new growth, 18 of mumps, 4 of anæmia and 1 of cyst.

LOCAL DISEASES.—*Diseases of the Nervous System* caused 55 admissions, the equivalent ratio being 6·0 per 1,000, which is higher than that for 1896 by 1·4 but below the decennial average ratio by 1·5. Among the cases were 10, or 1·1 per 1,000, of mental affection, and the remainder included 25 of neuralgia, 5 of paralysis and 5 of epilepsy. There were 2 deaths, one from abscess of brain and one from epilepsy.

There were 101 admissions for *diseases of the eye*, the ratio, 11·0 per 1,000, being below the previous year's rate by ·8, but above the average by 1·1. The cases included 79 of conjunctivitis.

Diseases of other Organs of Special Sense gave a ratio of 7·8 per 1,000, which is lower than that for the previous year by 2·8, and than the average rate by 3·3. Of 72 admissions, 58 were due to inflammation of the external meatus.

Diseases of the Circulatory System were the cause of 60 admissions and 4 deaths, including two invalids who died after leaving the command. The admission rate, 6·5 per 1,000, is more than twice that of the preceding year, but is only fractionally above the average rate. The cases included 39 of

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[*] There were 12 admissions for ulcer of penis of non-venereal origin, with ·79 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 167·6 and 14·87 respectively.

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disordered action, and 15 of valvular disease of the heart; 2 of the deaths were due to aneurysm of aorta and occurred out of hospital. The deaths of the invalids were caused by pericarditis and valvular disease of the heart. Many of the cases of disordered action of the heart were traced to the excessive use of tobacco, or dissipation, and generally required only a few days' rest and treatment in hospital for recovery.

Diseases of the Respiratory System.—150 admissions and 2 deaths are recorded. The admission rate was 16·3 per 1,000, which is above the previous year's rate by 4·2, but below the average rate for the ten years 1887–96 by 4·4. The death rate was ·22 per 1,000, comparing favourably with ·60 in 1896 and with ·55, the average rate. Bronchitic affections caused 108 of the admissions, and among the remainder were 15 admissions for pleurisy, 8 for spasmodic asthma, 8 for pneumonia and 5 for phthisis. One death was due to pneumonia and one to empyema.

Diseases of the Digestive System caused 927 admissions and 8 deaths, the latter including that of an invalid, equal to ratios of 101·0 and ·87 per 1,000, which are higher than corresponding ratios in 1896 by 29·7 and ·51, and than the average ratios for the preceding ten years by 22·3 and ·32 respectively. The principal causes of admissions were diseases of the mouth and throat 376 cases, hepatic affections 190 (including 165 of jaundice and 13 of hepatitis), diarrhœa 155, and dyspepsia 76 cases. 146 of the admissions for digestive disorders occurred in Crete and include 55 cases of diarrhœa and 34 of jaundice. The deaths were 2 from abscess of liver, 2, including the invalid, from peritonitis and one each from ulceration of stomach, intussusception of intestines, hepatitis and hæmorrhage of pancreas.

Diseases of the Lymphatic System, with 78 admissions, gave a ratio of 8·5 per 1,000, which is below the previous year's rate by 2·7 but fractionally above the average rate. All but 2 of the admissions were caused by inflammation or suppuration of the lymphatic glands

There were 10 admissions for *diseases of the urinary system*, or a ratio of 1·1 per 1,000, as compared with 1·8 in 1896 and with 2·0, the average rate. Most of the cases were due to incontinence of urine.

Diseases of the Generative System gave a ratio of 28·3 per 1,000, which is higher than that for the previous year by 1·2, but lower than the decennial average rate by 10·4. Of 260 admissions 89 have already been referred to under the heading of venereal diseases, and among the remainder were 80 for orchitis and 58 for balanitis.

For *diseases of the organs of locomotion*, 75 admissions are returned, the ratio, 8·2 per 1,000, being higher than in 1896 by 1·8 and than the average rate by 2·1. Synovitis and myalgia were the chief causes of admission.

Diseases of the Connective Tissue caused 265 admissions, or a ratio of 28·9 per 1,000, which is below the previous year's rate by 4·8, but above the average rate by ·9.

Diseases of the Skin gave a ratio of 50·5 per 1,000, which is above the average rate for the preceding ten years by 10·8. Of 463 admissions, 165 were due to boils, 158 to eczema, and 52 to ulcers. Eczema was prevalent during the summer in the Cottonera hospital district, "chiefly amongst the young soldiers of the infantry. It attacked principally the ears, sides of the face, wrists and arms, and was probably caused by irritation from bites of sand-flies or mosquitoes. It was very intractable."

INJURIES.—The total admission rate was 78·4 per 1,000, as compared with 90·2 in 1896 and with 88·0, the decennial average rate.

For *general injuries*, the total number of admissions was 12, viz.:—7 for multiple injuries, 2 for suffocation from submersion and one each for burn, scald and sunstroke. Two of the cases of multiple injury and the case of burn, which was caused by a tent catching fire, proved fatal; and in addition to these fatal cases 7 deaths occurred, out of hospital, from general injuries, viz.:—One from multiple injury caused by a fall from a bastion and 6 from suffocation from submersion (accidental drowning).

The admissions for *local injuries* were 707 in number, and were largely due to wounds, sprains and contusions. There were 5 deaths, one each being due to fracture of skull, fracture of spine and compression of brain, all due to falls, one to concussion of brain sustained through the capsizing *alta.* of a boat, and one to wound of throat, the last being the case of a patient in hospital who committed suicide while suffering from fever.

POISONS.—There were 4 admissions, three being accounted for by one man, who was thrice admitted for morphine poisoning. The fourth case was one of alcoholic poisoning and had a fatal termination. This death occurred in Crete in the case of a man who broke out of barracks after dark, and brought back a large quantity of native liquor which he drank almost at once. He was discovered insensible at "reveillé" the following morning, and died immediately after being taken to hospital.

INVALIDING.—The number of men invalided home during the year was 258, the equivalent ratio being 28·12 per 1,000, which exceeds that for 1896 by 6·72 and the average rate for the preceding ten years by 8·92. The invaliding rate in the artillery was 21·98 per 1,000, as compared with 20·29 in 1896, the highest ratio, 31·25 per 1,000, occurring in No. 30 Company Southern Division, and the lowest (excluding the two companies present only during the latter part of the year), 10·99 per 1,000 in No. 5 Company, Eastern Division. The Royal Engineers gave a ratio of 6·41 per 1,000, which is below the previous year's rate by 1·28. In the infantry, the ratio was 29·27, as compared with 21·96 in 1896, the ratios of the several battalions ranging from 54·79 in the 1st West Riding Regiment and 37·30 in the 1st Royal Lancaster Regiment to 7·41 in the 2nd Rifle Brigade and 9·94 in the 2nd Dorsetshire Regiment. Taking the ages of the men sent home, it is found that 20, or 15·61 per 1,000, were under 20 years of age; 161, or 31·38 per 1,000, were between 20 and 25; 60, or 28·83 per 1,000, were between 25 and 30; and 17, or 24·93, were 30 years of age and upwards. In the previous year the corresponding ratios were 15·64, 22·79, 22·32, and 17·61 respectively. As to length of service in the Command, 78 of those invalided, or 18·50 per 1,000, were in their first year; 112, or 30·83 per 1,000, were in their second; 48, or 55·49, in their third; 7, or 35·90 per 1,000, were in their fourth year, and 13 men, or 49·06 per 1,000, had been more than four years in the Command, the corresponding ratios for 1896 being 20·04, 24·62, 28·57, 8·26, and 20 20 respectively. The chief causes of invaliding were Mediterranean fever 112 cases, or 12·21 per 1,000 (the ratio of other continued fevers being 12·86 as compared with 8·30 per 1,000 in 1896); nervous affections 22 cases, or 2·39, an increase of ·59 (15 of these cases, or 1·63 per 1,000, were sent home on account of mental disorder); diseases of the circulatory system 16 cases (including 4 of disordered action of the heart), or 1·74 per 1,000, an increase of ·42; tubercular diseases 13 cases, or 1·42 per 1,000, an increase of ·34; secondary syphilis and diseases of the digestive system 11 cases, or 1·20 per 1,000, the ratio being the same in each instance as in the preceding year; and diseases of the respiratory system 10 cases, or 1·09 per 1,000, a decline of ·11. Most of the invalids were sent home by mail-steamers and other boats during the year and not delayed for transmission by hired transports.

There were 88 men discharged the service as medically unfit, the ratio being 9·59 per 1,000, which is above that for the previous year by 1·41, but below the average rate for the preceding ten years by ·94. The principal causes of discharge were diseases of the nervous system, 20 cases, or 2·18 per 1,000, an increase of ·50 on the rate in the previous year (14 cases, or 1·53 per 1,000, being due to mental disease); diseases of the circulatory system, 15 cases (including 2 of disordered action of the heart), or 1·63 per 1,000, an increase of ·07, and tubercular diseases, 13 cases, or 1·42 per 1,000, as compared with 1·08 in 1896.

OFFICERS.—In an average strength of 269, there were 188 cases of sickness, 5 deaths, and 13 cases of invaliding, the equivalent ratios being 698·9, 18·59, and 48·33 per 1,000, as compared with 727·7, 12·77, and 34·04 in the preceding year. Among the cases treated were 69 of simple continued and 11 of Mediterranean fever, 23 of injuries, 9 of diarrhœa, 6 each of influenza and synovitis, 5 of dysentery with 1 death, and 4 of enteric fever with 2 deaths, both the latter occurring in Crete. In no instance could the cause of the enteric fever be traced. The remaining deaths were due to ulceration of

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stomach and inflammation of intestines respectively. The causes of invaliding were Mediterranean fever 9 cases, and dysentery, debility, perforation of membrana tympani and hepatitis one case each.

Women.—The average strength was 422, and there were 212 cases of sickness and 4 deaths, the equivalent ratios being 502·4 and 9·48 per 1,000, which are higher than those for 1896 by 15·3 and ·07 respectively. The cases included 47 of simple continued and 13 of Mediterranean fever, 39 of debility, 21 of diseases peculiar to women, and 15 of diarrhœa. Two deaths were due to Mediterranean fever, and one each to malignant new growth and pneumonia.

Children.—There were 491 cases of sickness and 26 deaths in an average strength of 740, the equivalent ratios being 663·5 and 35·14 per 1,000, the former being higher by 149·2 and the latter lower by 15·34 than corresponding ratios in the preceding year. Among the cases treated were 78 of diarrhœa, 74 of bronchitis, 55 of measles (causing the closing of the St. Elmo Schools in June), 53 of simple continued and 6 of Mediterranean fever, 26 of eczema, 23 of debility, and 13 of dysentery. The deaths were 4 from diarrhœa, 4 from eclampsia, 3 each from tubercle and debility, 2 from dysentery, 2 from bronchitis, and 1 each from simple continued fever, Mediterranean fever, immaturity at birth, inflammation of the external meatus, pneumonia, disorders of dentition, inflammation of intestines and peritonitis.

Vaccination.—The whole of the vaccinations during the year were carried out with preserved lymph. Of 93 primary vaccinations amongst the children 22 were failures. There were 1,960 re-vaccinations amongst the men, 6 amongst the women, and 4 amongst the children, all the latter being successful, while failure resulted in 949 cases amongst the men and in 1 case amongst the women.

II.—Royal Malta Artillery.

The average strength of non-commissioned officers and men of this corps was 675, the principal statistics of sickness and mortality among them being given in the following table :—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
675	317	2	—	2	—	10	14·86	469·6	2·96	—	14·81	22·01

The admission rate is higher than that for the previous year by 46·3 but lower than the average rate for the preceding ten years by 85·3 per 1,000 ; the mortality rate is lower than in 1896 by 3·17 and than the average rate by ·20, while the ratio of constant inefficiency is higher in the two comparisons by 3·85 and ·16 respectively.

The average sick time to each soldier was 8·04 days, as compared with 6·65 in the year before and with 7·98, the average period for the preceding ten years ; the average duration of each case of sickness, 17·11 days, is longer than in 1896 by 1·41, and than the decennial average period by 2·74 days.

The sickness, mortality, &c., arranged according to the various sections of disease, will be found in Abstract IIIa.

General Diseases.—Enteric fever caused one admission in a trumpeter who lived at his mother's house, which was not in a good sanitary condition.

Malta. There were 42 admissions for simple continued fever (10 of these had a long course and were followed by debility and rheumatic pains, which point to their having been cases of Mediterranean fever rather than simple continued fever) or a ratio of 62·2 per 1,000, as compared with 47·0 in 1896 and with 55·6 the decennial average rate. For dysentery 2 admissions are shown, and there were 3 cases of tubercle of lung with one death.

Primary syphilis caused 6, secondary syphilis 3, and gonorrhea 10 admissions, a total of 19 admissions for venereal diseases, or a ratio of 28·1 per 1,000, which compares favourably with 32·7 in 1896 and 48·2, the average rate.

Under parasitic diseases 3 admissions are returned, 2 being for tænia solium and 1 for scabies, and there were 2 cases of alcoholism. Of 15 cases of rheumatism one was returned as rheumatic fever, and there were 4 admissions for debility and 1 for non-malignant new growth.

Local Diseases.—Diseases of the nervous system were represented by one case of neuralgia and one of dementia, and of 29 cases recorded under diseases of the eye, all but one were due to conjunctivitis. The medical officer in charge notes that granular ophthalmia was very prevalent amongst the civil population, with whom the men of the regiment frequently mix. There was 1 admission for inflammation of the external meatus and 1 for valvular disease of the heart. For diseases of the respiratory system there were 30 admissions, of which 22 were for bronchitis, 7 for pneumonia, and 1 for pleurisy, no death occurring. Diseases of the digestive system caused 18 admissions, including 10 for sore throat, 4 for diarrhœa, 2 for hernia, and 2 (one fatal) for hepatitis. Under diseases of the generative system are recorded 5 cases of orchitis, 4 of balanitis, and 1 of phimosis, and among the remaining admissions for local diseases were 10 for abscess of the connective tissue and 49 for skin affections, the latter including 18 cases of boils, 12 of ulcers, and 10 of eczema.

Of 69 cases of local injury, 23 were due to wounds, 21 to blisters of feet, 12 to sprains, 7 to contusions, 3 to burns, 2 to fractures, and 1 to rupture of muscle, the ratio of prevalence for injuries being 102·2 per 1,000, which is lower than that for 1896 and the average rate by 4·2 and 16·8 respectively.

Invaliding.—There were 10 men discharged as medically unfit for further service, or a ratio of 14·81 per 1,000, which is higher than that for the previous year by 6·63 and than the decennial average rate by 1·38. The causes of invaliding were tubercle of lung 2 cases, and debility, melancholia, dementia, conjunctivitis, ametropia, valvular disease of heart, psoas abscess, and psoriasis, one case each.

Officers.—There were 15 cases of sickness in an average strength of 24, the principal causes of admission being simple continued fever 6 cases, and bronchitis 2.

Women and Children.—In an average strength of 72 women only 3 cases of sickness are recorded, and among the children, with an average strength of 186, there were 32 cases, including 9 of measles, 5 of disorders of dentition, 4 of whooping cough, 4 of debility, and 3 each of simple continued fever, bronchitis and diarrhœa. Three children died, two from debility and 1 from whooping cough.

Vaccination.—There were 7 primary vaccinations amongst children with 5 failures. Of 252 re-vaccinations amongst recruits and 10 amongst other soldiers, 25 of the former and 7 of the latter were failures. All vaccinations were performed with preserved lymph.

In addition to the operations recorded above, 60 men were re-vaccinated on one day with preserved lymph obtained from England, with failure in every case, and it was concluded that the lymph had deteriorated. They were afterwards re-vaccinated with lymph from a fresh consignment and the results were more satisfactory.

Recruiting.—The number of men who presented themselves for medical examination on enlistment for the Royal Malta Artillery was 298, of whom 130 were rejected. The men were mostly labourers from the country districts, and the chief causes of rejection were under chest measurement 37, under height 25, defective vision 25, diseases of eyes and eyelids 13, and disease of heart 7. It is noted that 94 of the 168 men found fit were unable to read.

Malta.

SANITARY CONDITIONS.

I.—MALTA.

The Principal Medical Officer (Surgeon-Major-General T. Maunsell, C.B. reports that, generally speaking, the health of the troops in Malta during 1897 compared favourably with previous years, but he notes that the barrack accommodation is still insufficient, and overcrowding can only be avoided by placing men under canvas all the year round. In connection with the sanitary reports from the various districts, the following are the principal points noted :—

Floriana District.—The barracks, chiefly casemates, are old. Electric light has been introduced into them during the year. The drains have been relaid. The bath accommodation is noted as being quite inadequate in the Floriana barracks.

The *Isola District* is reported to be one of the least sanitary in the command. It consists of a number of scattered barracks or casemates. Those of the Isola Gate are reported to be dark, damp and ill-ventilated, and their walls are said to be covered with moisture in wet weather. The water supply for flushing and ablution purposes has to be pumped up from a well below the casemates; this well has sometimes to be kept filled with water brought in carts from a distance. The medical officer in charge notes that this system leads to excessive and unnecessary fatigues, insufficient water supply, insufficient flushing, and disuse of baths. A similar condition of affairs, though less aggravated, exists at the San Francisco casemates; while at the Pulverista casemates the flushing arrangements are described as being "as bad if not worse." The same officer also states with regard to the St. John's barracks that the "labour entailed during hot weather in procuring water for ablution and flushing purposes is almost incredible." He regards the casemates in this district as unsuited for occupation, and as liable to induce Mediterranean fever, and adds, "if it is unavoidable that these barracks should be used, the regiments in occupation should be frequently changed, and recent arrivals and young regiments should, if possible, be placed elsewhere." The drainage system is also reported to be defective, and St. Paul's barracks have been vacated during the year on this account.

In the *Ricasoli District* the quarters are generally of more modern construction, and consequently in better sanitary condition. During the year the drainage in Fort Ricasoli has been improved, and water has been laid on to Fort Delimaya. Most of the families are quartered in Fort Ricasoli, but 15 occupy lodgings in the village of Calcara, where the sanitation is said to be very imperfect.

At *Upper St. Elmo* and *St. James' Cavalier* no special sanitary points have been noted.

In the *Tigné District* the drainage of the hutments has been completed and that of the fort improved, but still further improvement is desirable in the storm water drainage. The concrete under the huts is said to be unsatisfactory and difficulties regarding the use of dry earth in the latrines are noted.

In the *Sliema* districts the quarters are mainly hired lodgings, which are noted as unsatisfactory on account of the existence of cess pits.

In the *Verdala District* the Verdala barracks and some quarters at St. Nicholas were vacated in August on account of defects in the drains. New drains have since been laid in the former, but work has not yet been commenced in the latter. There is a water carriage system of sewage disposal, but the flushing is by rain-water stored in reservoirs, which are apt to become exhausted in the dry season. The bath accommodation is considered inadequate, and the dual water supply system objectionable, as the taps for drinking and ablution water are close together.

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In the *Vittoriosa District*, the barracks have been lighted by electricity; the married quarters generally, the canteen at Fort Salvatore, and the recreation and guard room at Fort St. Angelo are noted as being small and dark. The latrines at Fort Salvatore are flushed from cisterns, filled by hand labour; at Fort St. Angelo they are reported to be old and inadequate for the number of men occupying the fort.

In the *Manoel District* some of the Fort casemates were condemned and converted into stores. With the exception of the canteen and sergeants mess huts, all the huts have now been raised and the soil underneath covered with concrete. The latrine floors have also been concreted, and new surface drainage is being laid. Old lascar tents have been replaced by E.P. tents. There are no married quarters, the families occupying hired houses in Tigné.

At *Marsamuscetto* the sanitary condition is generally satisfactory, with the exception of a drain at the entrance of the lower barracks, described as a "chronic nuisance," and the kitchen accommodation, noted as insufficient.

At *Pembroke Camp* the water supply for flushing was sometimes insufficient, and arrangements are being made for flushing with sea water. The kitchens have been enlarged, the surface drainage improved, and a new recreation room is being constructed. The stone floors in the married quarters have been replaced by concrete, but the quarters are reported to be without sculleries. The dry earth latrines were found difficult to keep in a sanitary condition. The officers' latrine, Fort Pembroke, was removed from the casemate. At Fort Madelena a new latrine was constructed, the means of ablution increased, and the drainage re-laid. The cess pit at Spinola battery was abolished and a new urinal constructed.

The *Forrest Hospital* is not large enough for Pembroke Camp and is supplemented by tents. The drainage was remodelled during the year, and the stone floors replaced by cement concrete. The outfall of the drainage in St. Julian's Bay is apt to become silted up during N. and N.E. winds, but the obstruction is readily removed.

The *Valletta Hospital* accommodation is also insufficient. Electric lighting was installed during the year in the hospital. The drainage of the upper and lower courtyards was relaid, the pipes having been rendered defective by the roots of trees growing into them. Separate latrines, &c., were arranged for the use of venereal cases and a large specially constructed bath in an old disused store fitted up for disinfection of their bedding and clothing. The floor of the large ward was again relaid, this time satisfactorily, with cement concrete. The ablution accommodation is considered insufficient, the kitchen ranges are old, and a separate latrine is wanted for the men of the Medical Staff Corps. The infectious wards have been added to the Royal Malta Artillery portion of the hospital as surgery, orderlies' room, recruits' room, and 6-bed ward, all infectious cases being now sent to the Civil Infectious Hospital.

The *Lower St. Elmo* barracks have had defects in drainage of the officers' quarters remedied. The ablution rooms are stated to be dark and damp and the water supply to the upper room is insufficient. The married quarters in Valetta are generally said to be difficult to keep in good sanitary condition, as they are badly situated and away from regimental control.

The *Cottonera Hospital* is stated to have an objectionable arrangement of the dual water supply, the ablution water being laid on throughout the building, while the drinking water is obtained only at the basement. No hot water is laid on to the upper floors, and the kitchen is considered too small.

At *Imtarfa* the barracks are new and considered satisfactory with the exception of the bath accommodation, the distance from the sea preventing men bathing. The existing accommodation is one general and one hip bath to each company. An outbreak of enteric fever was suspected to have been caused by pollution of water in the large reserve tank, which is an underground tank near the latrines, with considerable facilities for dust, &c., being blown into it. A chemical analysis was made of the water but no definite evidence of pollution was ascertained. Bacteriological examination, however, detected the presence of *bacillus coli* and the use of the water was discontinued in November. The tank was emptied, cleansed with quicklime (30 grains to the gallon) and flushed with spring water, and, in reporting

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on the result, the Medical Officer in charge writes that, "within three weeks the cases of enteric fever, Mediterranean fever, diarrhœa, dysentery, and jaundice, which prevailed during the autumn, ceased, and the Border Regiment, which is composed of extremely young men, has not furnished a single case of fever, diarrhœa, dysentery, or jaundice since its arrival at Imtarfa on 19th November to the date of writing (28th January, 1898); whereas last year amongst the seasoned soldiers of the Royal Lancaster Regiment cases of fever and diarrhœa occurred at intervals throughout the winter."

At *Citta Vecchia Sanitarium* the drainage system was completed. Cases of Mediterranean fever transferred from other districts did well once convalescence was established, but residence in the Sanitarium did not cut short the fever or prevent relapses.

At *Gozo* the sanitary conditions are satisfactory, though the barracks are old. A night latrine was constructed, and, at the hospital, ventilation was improved and the stone floors of all the wards but one replaced by cement concrete.

The *Royal Malta Artillery* has insufficient barrack accommodation and a considerable number of the men (100) are allowed to sleep at home. No ration is issued but the men get 4*d.* daily in lieu. The school used by the R.M.A. is considered too small and the khaki clothing regarded as unsuitable for winter wear.

II.—CRETE.

Crete.

In connection with the International occupation of the island, British troops were encamped in Crete from 24th March, 1897, onwards. The first detachments were 1 Company 1st Seaforth Highlanders at Canea and headquarters and 5 companies at Kandia. The remaining companies of the Seaforth Highlanders and headquarters and 4 companies of the 2nd Royal Welsh Fusiliers joined on the 8th April, 1 company of the Seaforth Highlanders disembarking at Canea, and the remainder of the reinforcements at Kandia. On April 26th, No. 4 Mountain Battery Royal Artillery arrived, and early in August the remaining companies of the Royal Welsh Fusiliers. In November the Mountain Battery and the Seaforth Highlanders returned to Malta.

The following notes on the Sanitary Conditions existing in Crete in connection with the stations occupied by the British troops there are compiled from a report by Surgeon-Major W. Babtie, the Senior Medical Officer. The island is traversed throughout its whole length by a lofty chain of mountains composed of three distinct groups which form the natural political divisions of the island. On the west are the Sphakiote Mountains, snow-clad through 8 or 9 months of the year, in the centre is another range culminating in Mount Ida, about 8,000 feet above the level of the sea, while on the east is the Kittia range. There are no important rivers in the island, and the torrents which descend from the mountains nearly all dry up during the heat, but there are numerous springs on the lower slopes of the hills which supply water for irrigation, &c.

The climate is on the whole good, though at times trying owing to the debilitating and enervating south winds in summer, and the gales and heavy rain in winter. From April to the end of June the weather was charming and not excessively hot. In July, August, and September, it was hot, but not extremely so, and then only on very still days, or when the south wind blew; on one or two occasions the thermometer in a staff-sergeant's tent registered 100° F., but this was the maximum recorded. In October the temperature began to fall and the nights got cooler. November and December were exceptionally wet and cold, and stormy, but the thermometer did not drop below 46° F. in the daytime.

At Kandia the troops remained free from *enteric fever* until 3rd June, when a case occurred in a man of the Seaforth Highlanders. The total number of cases admitted to the end of the year was 32 (2 officers and 30 N.C.O. and men). The prevalence of the disease divided itself into two periods, the first from 3rd June to 9th August, in which time 23 cases occurred, and the second from 12th October to 20th December, between which dates 9 patients were admitted. From 9th August to 12th October there were no admissions. The cases were widely distributed throughout the different corps, 4 being in the Royal Artillery, 16 in the Royal Welsh Fusiliers (3 after the Seaforth Highlanders and Royal Artillery left in November), 9 (1 an officer) in the Seaforth Highlanders, 2 in the Medical Staff Corps, and 1 (an officer) in the Army Service Corps. They were nearly as widely distributed as regards the location of the tents in which the men resided and the companies to which they belonged. Efforts to trace the source of infection were unsuccessful, but it is clear that it did not originate in water or other article of supply common to the troops. Unauthorized supplies from outside were suspected, and it was reported about the middle of July that a native had been seen in the lines selling milk to soldiers early in the mornings. This man was caught with a supply of fresh milk concealed in a kerosine tin, on 20th July, and steps were taken whereby he was excluded from the lines in future. The suspicion that this was the cause was accentuated when it was found that no cases occurred for two months after 9th August, but no actual connection was established. The cause of the cases that occurred in the second period could not be traced, but from their distribution it is probable that they were also due to illicit supplies obtained either in the town or lines. The two cases in the Medical Staff Corps were probably contracted during attendance on cases of the disease in hospital. The two officers affected lived in the same mess, and it is possible that their cases may have been connected with that of a mess servant admitted between a fortnight and three weeks before.

Every effort has been made throughout the occupation to regulate the hawking of articles in the lines. Men authorized were supplied with passes, restricted as to the articles sold, which were constantly inspected, and were only allowed to ply their trade under the immediate supervision of the regimental police at appointed places ; but from the position of the camps, situated on a road within a stone's throw of the town, it was not possible to prevent the entrance and sale of unauthorized articles. Condensed milk was only permitted to be sold in the grocery bars in camp.

At Canea 6 cases of enteric fever occurred, the origin of which was not traced, but 2 cases were in men of the Medical Staff Corps, and may have been contracted in hospital.

At Malta, 3 cases transferred from Crete with Mediterranean fever were afterwards diagnosed as enteric fever.

Dysentery was prevalent from the beginning of the occupation, new-comers being especially prone to this complaint. It was probably due to the inhalation of excremental matter carried as dust from the town or the foul area outside.

Mediterranean fever was common throughout the summer, the cases being similar to those seen in Malta.

Febricula of the type common in the Levant and Egypt was prevalent in the autumn months. The cases were sharp in character, but of limited duration, though sometimes convalescence was rather long.

Ague was another common source of admission to hospital in the autumn, and many of the cases were in men with no previous malarial history. About two miles to the west of Kandia, where the Ghazi river reaches the sea at Almyro, there is an extensive marsh, and the Turkish outpost at Ghazi about three-quarters of a mile up the valley, had to be evacuated in the autumn, owing to the prevalence of malarial fever among the Turkish troops stationed there. Malarial fever also prevailed to some considerable extent among our men, and some of these cases were attributable to exposure to malaria, when shooting on the range to the west of the camp in the Ghazi direction.

Canea, the capital of the island, was occupied by Russian, Italian and French detachments as well as by British troops, but at Kandia only British troops were encamped, the Russians occupying by themselves the town of Retimo, the Italians Hierapatra and the French Sitia. At Canea the detachment of British troops was at first quartered with the other International Forces and with the Turks in the Flag Redoubt. As, however, the place was filthy and overcrowded, our troops were soon removed to a camp in the

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Municipal Gardens, where they occupied a new building intended as a theatre, which afforded room for about 100 men, the remainder being encamped in an adjoining field. The hospital camp was pitched quite near in the gardens, in part of which a detachment of Italian Bersaglieri were also encamped. The water supply was that of the town, and was reported to be of good quality by the Consul, Sir A. Billiotti, but as a precautionary measure it was boiled before use. The ordinary field latrine was at first used, but a bucket system was soon afterwards introduced. Field rations of good quality with well baked bread were issued, and a canteen with supplies of excellent quality established. Our troops remained in this camp until August, when in consequence of the prevalence of fever and the ground having become much fouled, it was, on the recommendation of the Principal Medical Officer, Malta, who visited the island at this time, moved to the residential suburb of Halepa, about two miles from Canea, where an excellent site overlooking the sea was found, and where water was obtained from a spring where contamination seemed impossible. With the approach of winter the hospital was moved into a villa near the camp, which affords accommodation of a most satisfactory description.

Kandia has a normal population of 16,000 to 20,000, but at the time of occupation was said to contain upwards of 40,000 inhabitants owing to the influx of Moslem refugees. It was found in a deplorable sanitary condition. An epidemic of small-pox was raging, and decaying offal littered the streets in great heaps, as practically no attempt at conservancy was made. The town is partially drained, but the only adequate sewers are the main ones built by the Venetians, the subsidiary ones, of more recent origin, being square in section and built of rough unhewn stone without mortar in many instances. They consequently permit the escape of the fluid portion of the sewage, and quickly become blocked. Some houses are supplied with water closets of ancient and inefficient pattern, but, in those of the poor, a cesspit is dug under the boundary wall, partly in the house or its courtyard and partly in the street. These pits are mere holes in the ground and unlined in any way, and so, permitting the absorption of their fluid contents, do not require to be emptied often. They are covered in with a few sticks and old mats, on which earth, frequently the dried contents of the pit at its last emptying, is heaped. The ventilation of the drains and those pits is naturally free into the streets and houses. The subsoil is everywhere saturated with the filth of ages, and it is rare to see clean earth turned up anywhere in the town. Every street corner is used as a urinal and the streets themselves as latrines by the juvenile population at all times, and by their seniors under cover of night. The principal streets of the town which alone are fit for vehicular traffic are paved with large flat granite setts, and are broad and airy; all the others are narrow and tortuous and paved with rough cobble stones.

The chief water supply is from the aqueduct, a relic of the Venetians, which runs for miles out into the country beyond the Turkish Cordon, and could be cut by the insurgents at any time. It is a masonry channel of good construction originally, but constantly liable to pollution *en route* to the town owing to numerous openings in it, some due to bad repair and others purposely made for drawing water in buckets. The water, which is collected in two large covered tanks outside the New Gate, is fairly well distributed throughout the town in iron pipes, but the pipes and the fittings are imperfect and the supply intermittent and scanty, especially in the summer months. The water itself is as a rule of good quality, but it is surface in origin and after wet weather very milky in appearance. Another source of supply is from wells, public and private. The principal of these is one of great size and unfailing supply near the Great Redoubt on the outskirts of the town, but it lies low, and the higher ground about is covered with accumulations of manure and rubbish. It is properly steined but uncovered, and as everyone using it draws the water in his or her own vessel it is constantly liable to pollution. Many public and private wells also exist, in all of which from their construction and situation the water must be of the foulest description. The water for the troops was originally obtained from the town aqueduct, pipes being laid to the camps, and as a matter of precaution it was ordered to be boiled before use for

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drinking or cooking, Soyer's stoves being provided for the purpose. On April 15th, the aqueduct water was cut off from the town and camps, and the other local supplies from wells were either extremely polluted or liable to become so, and before even the great well water could have been used it would have been necessary to purify it with permanganate of potash, cover it in, remove the filth in the vicinity, and have a pump fixed so that "dipping" could not be resorted to. This, however, was not necessary as the Senior Naval Officer arranged to supply the water required by the troops as a temporary measure and the following day the aqueduct water was again available. This incident accentuated the necessity for a condensing ship, and on April 26th, the ss. "Samaria" arrived with the 4th Mountain Battery, Royal Artillery, and was retained for condensing purposes. Condensed water was thereafter used for drinking and cooking till about the middle of October, when the "Samaria" was replaced by the ss. "Turquoise," as with the approach of winter, when a vessel could not remain continuously in the roadstead, either a shore apparatus or a ship that could lie in the harbour was necessary. The "Turquoise" however, through defects in her machinery, though able to condense pure sea water, was not able to render the harbour water free from taste and smell, though chemically pure enough; and had soon after to proceed to Malta for the necessary alterations to be made. On her departure boiled aqueduct water had again to be resorted to, and it is at present in use. Washing water has all along been obtained from the aqueduct or wells, and great care has been necessary to keep the dual supply separate. The water barrels, whether for storage or carriage, are periodically cleansed with a solution of permanganate of potash. At first the issue of condensed water was 2 gallons per head, but on June 19th, this was, owing to difficulties in its production, reduced to 1 gallon, which was found insufficient, and the quantity was raised to 1½ gallons on July 8th.

The immediate neighbourhood of the town outside the walls, which apparently had always been used for the deposit of refuse and dead animals, was polluted to such an extent that an excursion outside the gates was a most unpleasant experience. Much of the ground was immediately below, and partly to windward, of our camps on the ramparts. On the beach to the west, but outside the town, the municipal abattoir is situated, and the carcases are brought into the town uncovered, on donkey back, often through clouds of putrescent dust from the polluted area just mentioned. The condition of this building was so bad that it was necessary to erect a private slaughter house for the use of the troops and, to avoid the dust, to provide a covered cart for the conveyance of the meat to camp.

It has already been said that small-pox was epidemic in the town on arrival of the troops, and it was impossible to walk through the crowded streets without literally rubbing shoulders with people in all stages of the disease. No attempt was made to deal with this pestilence, and offers to establish a vaccine station for the civil population and supply lymph to the native practitioners were received with apathy, and, with the exception of the fact that a few of the more intelligent natives came for vaccination, little or nothing was done to combat it. This epidemic gradually exhausted itself, but was succeeded by dysentery, typhus, Mediterranean, malarial and enteric fevers. The population, however, generally seems wonderfully immune to filth diseases. Leprosy is known to exist in the island, but only some cases of leucoderma and none of true leprosy were seen by the Senior Medical Officer, although a hamlet within a mile is known as Leperstown. Reliable statistics of mortality were not obtainable, but that the death rate is a high one is a reasonable inference from the number of funerals passing through the gates to the enormous overcrowded cemeteries just outside the walls.

The condition of the town and its neighbourhood was a source of great anxiety from a sanitary point of view, owing to parts of the town being within a stone's throw of our camps, and the necessity that existed for our men to frequently pass through the town on escort or convoy duty. In the month of August, in anticipation of partial autumnal rains likely to be followed by hot still weather, an establishment of twelve native scavengers under British non-commissioned officers was sanctioned in order to remove, bury, or burn the refuse heaps outside the walls, and this was accomplished very successfully. In September a grant of £150 monthly was sanctioned by Her Majesty's Government to enable us to take over the conservancy of the town and at least palliate the evils described above. British non-commissioned officers as overseers could not for many reasons be employed in the town, and resort was had to municipal and gendarmerie employés, headed by a lieutenant of the latter; the whole being entrusted to Surgeon-Major Babtie's supervision and direction. The town was mapped out into districts, and squads, each consisting of one overseer, sweepers, sewermen, with a proportion of mules or donkeys and their drivers, were detailed for each district. The accumulations of refuse were gradually removed, and a regular system of scavenging introduced, the drains repaired and cleared as far as possible, streets mended where dangerous to life or limb, filthy corners, and, wherever possible, houses occupied by refugees washed with quicklime, cesspits, wherever the owners were unable to do so themselves, emptied, dead animals removed from the streets and buried, etc., and by steady work a considerable improvement has been effected in the condition of the town. Only minor works of a permanent nature, such as making short lengths of drains to connect with the sewers, have been possible. Crete

The permanent buildings in use by the troops are, at Canea, the hospital and officer's mess, and at Kandia the Greek Hospital. The officer's mess at Canea is a substantial villa adjoining the camp, and the hospital is situated about half a mile from the camp on high ground overlooking the sea. It is a villa of two floors and has a good kitchen, bathroom, verandah and the usual offices. Four rooms and a landing are available for patients. The wards, all on the upper floor, afford, on an average, 58 square and 675 cubic feet per patient. Similar rooms below could also be used if required, the surgery, store and barrack rooms being placed in tents in the large garden. The hospital water supply is that of the troops, and the latrines are on the dry earth system

At Kandia the unfinished Greek hospital was at first used as a barrack, but latterly, on the departure of the Seaforth Highlanders, was taken over by the Field Hospital. When the troops arrived here, it was a mere shell, in process of construction; but windows, doors, partitions, &c., have since been added, and it is now comfortably fitted up and makes a good hospital for the reduced garrison. In the autumn when the garrison was larger and the sick rate higher, it would not have accommodated half the sick. The building consists of one floor and a basement, and is arranged with the administrative block in the centre, on either side of which are two large pavilion wards. The kitchen, offices, and stores are in the basement. The building is situated on high ground adjoining the ramparts and is the most easterly portion of our camp, and south of the town. It is sufficiently high to afford an extensive view of the sea, from which it is distant about half a mile. The building is practically undrained, and the ventilation is ample. In each of the two large wards there are 6 windows on either side, and the others are also well lighted and ventilated. The wards, &c., are lighted by means of kerosene lamps, and warming stoves have been provided for those wards which are likely to be in use in the winter.

With the exception of the men occupying the Greek Hospital, all the troops have been accommodated in Indian pattern European privates' tents, which were pitched on the western portion of the rampart which encloses the town from sea to sea. The space was scanty and some digging was necessary before the tents could be properly pitched, but this disturbance of the soil was not attended by any bad effects. The European privates' tent is too well-known to require further description, and the experience of it here in all weathers has confirmed everything that has been said in its favour in other countries. Clay being plentiful, the men were able to make well raised puddled floors which were easily kept clean, even in bad weather. When it became known that the huts could not arrive before winter set in, wooden linings were supplied for the walls of the tents, and added greatly to the comfort of the men. A proportion of marquees was supplied for hospital purposes; but they are not well suited for standing camps, and compare very unfavourably in comfort with the European privates' tents, for which they were discarded.

r:le.

Huts for the troops arrived at the close of the year, and are now in course of erection. They are of very substantial construction, and each accommodate 50 men, with bath and ablution rooms, and a serjeant's bunk. As they are 147 feet long and 21 broad exclusive of an 8 foot verandah, some difficulty was experienced in finding suitable sites for them on the ground available.

No bath rooms exist at present, but will be available in some at least of the new huts where drainage can be arranged for. Wooden shelters for ablutionary purposes have been erected where required. Bathing parades were regularly held twice a week throughout the summer months, and were most popular with the men.

The latrines are on the dry earth and bucket system, the soil being removed and buried in trenches outside the town by a number of native scavengers, who were engaged soon after our arrival and work under the regimental pioneers. The latrines are all under cover and are carefully looked after.

The Field Ration has been issued to the troops throughout the occupation. This ration, which is free, has been much liked by the men, and although somewhat deficient in fresh vegetables, has proved satisfactory. The men have been so satisfied with it that they have been averse to any stoppage for extra messing, preferring to supplement their dietary by individual purchases of extras, including fruit and vegetables, large quantities of which have almost constantly been available. The bread supplied by contract has, as a rule, been of good quality and well baked. The meat ration has consisted of beef only, and the quality has been on the whole satisfactory, although often coarse and tough. Preserved meat and biscuit were issued once a week, but comparatively little of the former, and almost none of the latter was used, the men preferring to buy bread and other extras at the grocery bars. The cooking was performed in "broad-arrow" kitchens, provided with the usual camp kettles, and improvised ovens made of clay and sheet iron, and has been satisfactory. The kitchens have been provided with wooden roofs as a protection from the weather, and have answered all purposes.

The hospital was non-dieted, but arrangements were made for drawing the patients' rations in bulk from the Army Service Corps, and from these and the authorized extras four diets, viz., plain milk, milk, beef tea, and entire, were improvised and proved sufficient. The extras available were on a liberal scale and of excellent quality. Fresh milk was difficult to obtain, and at no time was a thoroughly adequate supply available. Owing to the poverty of the town the goats were poorly fed, besides which the local goat is not a good milker, and cow's milk was not obtainable in any quantity. There was also some trouble in getting the goats brought to the hospital for milking. But this was insisted on, as it was impossible to accept milk under any other conditions. Ultimately the supply of goat's milk practically failed altogether, and a few cows were imported by the contractor, but even then a sufficient supply could not be got. When the hospital was under canvas the cooking was done in field kitchens, but four small cooking ranges have been fitted in the building at present used as such. At Canea a similar course was adopted and the hospital there has been supplied with a cooking range recently.

Khaki has been practically worn throughout the occupation, supplemented in the winter months by cardigan jackets. Owing to the excessive wear and tear of clothing, a free issue of one suit khaki, one pair serge trousers, one field service cap, and one pair camp shoes, of the M.S.C. ward shoe pattern, was sanctioned for each man. Shoes are very necessary articles of camp kit, but the ward shoe pattern, excellent in other respects, has a stiff heel and would be difficult to pack and carry on the march. During the winter, guards, &c., paraded in serge trousers and wore their cardigan jackets under their khaki coats during the day, while at night serges and great-coats are worn.

At first the men slept on the ground, being supplied with a waterproof sheet and two blankets. There were bedslips in store, but for a considerable time straw was not obtainable, but, as soon as it was, filled beds were used. Later, bed-boards and trestles were obtained, but the latter could not be issued until the number of men in each tent could be sufficiently reduced to afford room for them. When the weather began to get cold, a third, and, later, a fourth blanket per man was issued. In hospital there was a proportion of trestle beds and hair mattresses from the first, and the numbers were augmented as required, till a full complement was obtained. Hospital sheets and feather pillows were issued in all serious cases, and barrack sheets are now issued to all patients. Washing has sometimes been a difficulty but has been satisfactorily carried out by the Medical Staff Corps. The scale of washing materials allowed at stations where the washing of underclothing, linen, &c., is done by the Army Service Corps is inadequate in a field hospital. *Crete.*

The duties of the troops have consisted of the usual guards, parades, fatigues, &c. The fatigue duties have been heavy, due to the necessity of unloading and removing large quantities of stores from the quay, preparing sites for tents, road making, water fatigues, &c. Route marching within the line of the Turkish outposts, but occasionally into the insurgent territory, was begun soon after arrival, and was continued weekly throughout the summer, unless on exceptionally hot days. Marching took place at the discretion of Commanding officers, at different hours, but during the hot months, the best hours were between 9 o'clock a.m. and noon, when, if the valleys were avoided, the men had the benefit of the refreshing sea-breeze which blows strongly in summer after 9.30 a.m. Frequently the hottest part of the day was between 7.30 and 9.30 when the sun was powerful and there was no breeze. The men benefited greatly, not only from the exercise, but from the change of scene and experience, which varied the monotony of an existence confined to camp. No evil effects resulted from this marching. The marches were rarely long, and were, as a rule, varied with tactical exercises. The regimental stretcher bearers from all corps, with such men of the Medical Staff Corps as could be spared, with a proportion of stretchers, panniers, cacolets, &c., under a Medical Officer, as a rule accompanied the columns, and through the co-operation of Officers Commanding, some valuable training was effected in this way.

No regular gymnastic course was possible, but physical and running drills were regularly carried out. There was of necessity some lack of amusements, but football, cricket, hockey, quoits, &c., were played by the men. Reading tents, established by the chaplains of the different denominations and by the Army Temperance Association, afforded means of recreation for many men.

Canteens under contractors accompanied each of the battalions and the mountain battery, and were established, in the case of the Seaforth Highlanders, in a portion of the Greek hospital, and in the Royal Artillery and Royal Welsh Fusiliers at first in tents and latterly in wooden buildings erected for the purpose. The Royal Welsh Fusiliers and Seaforth Highlanders' canteens were soon equipped with aerated water machines, erected in the stores connected with them, and conducted under the supervision of the canteen president and a medical officer. Condensed water was supplied for the machines, and the mineral waters manufactured were wholesome and cheap. The issue of beer was limited at first to two, and later to three pints per man daily.

There has been at various times some intemperance. This has been due to the facilities for obtaining native liquor. The local law prohibits the sale of liquor to a Turkish soldier, and this protection has now been extended to the British troops.

In August, when the political situation rendered it possible, Sir H. Chermside suggested that a camp for convalescents might be established at Rhoggia, a Christian village on the western side of Kandia Bay, and about 1,000 feet above sea level. A camp was accordingly arranged on a beautiful site near the village overlooking the sea. The village could only be reached by sea, owing to the danger of passing through the outpost lines, and on September 13th, an advance party of men in health was despatched to prepare the camp, the first batch of 20 convalescents following on the 17th. A Medical Officer was detailed for duty there, accompanied by a small party of the Medical Staff Corps, equipped with an European privates' tent for sick, a pair of panniers and other necessaries. Only convalescent patients could be sent owing to the fatigue of the journey, which involved a climb of 1,000 feet over a very rough mountain path or mule track. Men who had sufficiently improved in health returned to Kandia after a stay averaging a fortnight, and were replaced by others. At first the men derived marked benefit from

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the change of air, scene and experience, but the camp did not quite fulfil expectations in this way, as attacks or relapses of fever were not uncommon, due in part to the broken weather experienced in October. It was intended to close the camp on October 29th, but owing to continued bad weather, the last party could not be relieved till November 8th. If a camp is formed next summer, it should be opened early in July and closed not later than October 15th. The existence of this camp relieved the pressure on the hospital accommodation, and in a considerable number of instances obviated the necessity of transferring patients to Malta for change.

V.—ON THE HEALTH OF THE TROOPS SERVING IN THE DOMINION OF CANADA.

SICKNESS AND MORTALITY.

Canada.

The average strength of the troops serving in the Command was 1,601, of whom 1,546 were stationed at Halifax, N.S., 27 at Esquimalt, British Columbia, and 28 at Fredericton, New Brunswick, the latter station being occupied by a company of infantry during the summer. The troops stationed in the Command throughout the year were the 20th Company, Western Division and the District Establishment, Royal Artillery, the 18th and 40th Companies, Royal Engineers, and detachments of the Army Service Corps, Medical Staff Corps, Army Ordnance Corps, Army Pay Corps, and Garrison Staff. The 1st Company, Western Division, Royal Artillery, and the 1st Battalion Royal Berkshire Regiment, left for the West Indies in October on relief by the 19th Company of the same division and the 2nd Battalion Leinster Regiment, both from Bermuda.

The following table shows the admission, mortality and invaliding rates, etc., among the troops in the Command.

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
1,601	863	—	1	1	23	15	38·05	539·0	·62	14·36	9·37	23·77

In comparison with the previous year there is a decline of 30·1 in the admission rate, 2·70 in the mortality rate, and 4·59 in the ratio constantly sick.

With regard to the average ratios for the preceding ten years the admission rate is higher by 39·9, but the mortality and constantly sick rates are lower by 3·75 and 1·77 per 1,000 respectively.

The average sick time to each soldier was 8·67 days, which is shorter than the corresponding period in 1896 by 1·71 days and than the average period by ·65 of a day. The average duration of each case of sickness was 16·09 days, which is also shorter in the two comparisons by 2·15 and 2·59 days respectively.

In Abstract XXVI is a table showing these health statistics for the various corps which served in the Command during the year. Excluding detachments and the two corps which arrived in October, the highest admission ratio was 558·4 in No. 20 Company, Western Division, Royal Artillery, the next highest being 547·8 in the 1st Battalion Royal Berkshire Regiment. The lowest ratio was 238·1 in the 40th Company, Royal Engineers. In the detachment of the 18th Company, Royal Engineers, at Esquimalt, the admission rate was 347·8 per 1,000. There was no death in the Command during the year. The highest constantly sick rate was 28·51 per 1,000, in the 20th Company, Western Division, Royal Artillery, the next highest ratio being 27·28 in the 1st Battalion Royal Berkshire Regiment and the lowest 7·43 per 1,000 in the 40th Company, Royal Engineers.

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With regard to the influence of age on the sickness and mortality, the admission ratio among men under 20 years of age was 815·2 per 1,000, among men between 20 and 25 years 650·5, among men between 25 and 30, 471·2, and among men over 30 years of age 166·7. In 1896 the highest ratio was that of men between 20 and 25 years; and the lowest, as in 1897, was among men over 30.

As to service in the Command, the highest ratio was 775·6 per 1,000 among men in their first year, followed by 479·1 among men in their second year, 257·0 among men in their third year, and 194·7 among men who had been three or more years in the Command. In the previous year also, the highest ratio was among men in their first year, and the lowest among men with more than three years' service.

In Abstract IV will be found the sickness, mortality, etc., arranged according to the different sections of disease.

General Diseases.—There were 9 admissions for *eruptive fevers*, 7 being due to measles and 1 each to rubella and scarlet fever. In the previous year there was only one admission under this head, namely, for scarlet fever. *Influenza* caused 30 admissions, or 18·7 per 1,000, as compared with 23·9 in 1896 and 7·1, the average rate for the preceding ten years. *Enteric fever* caused the admission of one man, a recruit enlisted in the colony, who contracted the disease before joining. There were 2 admissions for *simple continued fever*, while *septic diseases* were represented by a single case of erysipelas.

Tubercular Diseases caused 6 admissions, of which 3 were for tubercle of lung, the ratio 3·7 per 1,000, being higher than that for 1896 by 3·0 and than the average rate by 1·2.

Venereal Diseases.—There were 50 admissions for *primary syphilis*, or a ratio of 31·2 per 1,000, as compared with 34·6 in 1896. If to this be added the sickness from soft chancre, for which there were 4 admissions and ·14 constantly sick, the admission ratio for all primary venereal sores becomes 33·7 per 1,000, which is less than the ratios of the previous year and of the decennial average by 16·2 and 3·6 respectively. *Secondary syphilis*, with 49 admissions, gave a ratio of 30·6 per 1,000, which is higher than that for 1896 by 17·3, and than the average ratio for the preceding ten years by 12·8. *Gonorrhœa* caused 99 admissions, or a ratio of 61·8 per 1,000, which is less than the previous year's rate by 4·7 but greater than the average by 1·9. The total admission ratio for all forms of venereal disease was 126·1 per 1,000, a ratio lower than that of 1896 by 3·6 but higher than the decennial average rate by 11·1. The number of men constantly sick from all classes of venereal disease was 12·53, equal to a ratio of 7·82 per 1,000, which is higher than that for the previous year by ·59 and than the average rate for the ten years 1887–96 by 1·06.* With reference to venereal disease in the Command, the Principal Medical Officer, Surgeon-Colonel McWatters, remarks that "efforts to mitigate the evil are being tried by placing infected localities out of bounds to the troops, and with some temporary beneficial effect, but more legislation is necessary."

The average number of days in hospital for each case of gonorrhœa at the Station Hospital, Halifax, under the special treatment referred to in last year's report, was 13·34.

Parasitic Diseases caused 45 admissions, namely, 39 for scabies, 4 for ringworm, and 2 for phthiriasis. An unusual number of cases of scabies occurred amongst drafts from England and in the Leinster Regiment on its arrival from Bermuda. These cases have been attributed to contagion on board hired transports in October and November; but it is also noted that there was a number of cases in March in the Berkshire Regiment attributed to contagion introduced from the town.

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* There were 5 admissions for ulcer of penis of non-venereal origin, with ·23 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 129·3 and 7·96 respectively.

Canada.

Alcoholism caused 6 admissions, including 2 for delirium tremens.

Rheumatism.—There were 32 admissions, or a ratio of 20·0 per 1,000, which is below the previous year's and the average rates by 27·2 and 10·0 respectively. No case of rheumatic fever is recorded. For *debility* there were 2 admissions, and the cases shown under the heading of *other general diseases* comprised 4 of non-malignant new growth, 3 of cyst, and 1 each of mumps and anæmia.

LOCAL DISEASES.—For *diseases of the nervous system*, including mental disorder, there were 14 admissions, the admission ratio, 8·8 per 1,000, being higher than the previous year's rate by 6·1, but lower than the decennial average by 1·2. The cases were 6 of neuralgia, 2 each of epilepsy, vertigo and mania, one of hysteria and one of melancholia.

Diseases of the Eye were the cause of 7 admissions, of which 6 were cases of conjunctivitis. The ratio of admission was 4·4 per 1,000, which is lower than that for 1896 and the average rate by 8·9 and 4·1 respectively. *Diseases of the ear* gave 11 cases, or 6·9 per 1,000, as compared with 7·3 in the previous year and 6·2, the average for the ten years 1887–96.

Diseases of the Circulatory System with 5 cases gave a ratio of 3·1 per 1,000, which is lower than that for 1896 and for the preceding ten years by 2·2 and 5·5 respectively. There was one case each of valvular disease, dilatation of heart, disordered action of heart, obstruction of veins, and thrombosis. An invalid died from valvular disease of the heart.

Diseases of the Respiratory System.—40 cases are returned, the admission ratio being 25·0 per 1,000, which is lower than the previous year's rate by 6·2 and than the average by 10·7. There were 25 cases of bronchitis, 12 of pleurisy, 2 of pneumonia and one of broncho-pneumonia. Most of the cases of bronchitis occurred in troops arriving from Bermuda in October, and the Medical Officer in charge of the Station Hospital, Halifax (Deputy Surgeon-General Oliver), remarks that two months earlier would be a preferable time to make these changes.

Diseases of the Digestive System gave 96 admissions, equal to 60·0 per 1,000, which is lower in both comparisons by 14·5. The cases included 59 of throat affections, 12 of dyspepsia, 6 of jaundice, 5 of piles, and 4 of diarrhœa.

Diseases of the Lymphatic System caused 18 admissions, the ratio, 11·3 per 1,000, being below the preceding year's and the average rates by 17·9 and 5·5 respectively. 15 of the cases were due to inflammation and 3 to suppuration of the lymphatic glands.

Diseases of the Urinary System with 4 admissions, gave a ratio of 2·5 per 1,000, which differs but fractionally from that for 1896 and the average rate. *Diseases of the generative system* were represented by 30 admissions, which include the 4 cases of soft chancre previously referred to under venereal diseases. Among the remaining admissions there were 11 for balanitis and 5 each for orchitis and ulcer of penis (non-venereal origin). The ratio of prevalence was 18·7 per 1,000, which is below that for the preceding year by 17·8 and the average rate by 8·2.

Under the heading of *diseases of the organs of locomotion* 9 admissions are recorded, including 3 each for ostitis and synovitis. The ratio, 5·6 per 1,000, is lower than that for the previous year and than the average rate by 11·0 and 3·9 respectively. For *diseases of the connective tissue* there were 36 admissions, 27 being for abscess and 9 for inflammation; the ratio of admission was 22·5 per 1,000, which is above that for 1896 by 3·2 and the decennial average rate by 1·2. There were 77 admissions for *diseases of the skin*, the ratio, 48·1 per 1,000, being above the average rate by 22·2. Ulcers, boils, eczema and whitlows were the principal causes of admission.

INJURIES.—One admission for *general injury* is recorded under the heading of heat stroke, which occurred in September. For *local injuries* there were 169 admissions, including 50 for wounds, 45 for sprains, 39 for contusions, 10 for blisters of feet, 8 for burns and scalds, and 7 for frost-bite, the latter occurring in January, and being all mild cases mostly affecting the ears. The ratio of admissions for injuries was 106·2 per 1,000, which is in excess of the previous year's and the average rates by 33·0 and 30·2 respectively.

Canada.

INVALIDING.—The number of men sent to England as invalids during the year was 23, equal to a ratio of 14·36 per 1,000, which is below the invaliding ratio in 1896 by 1·60 but fractionally above the decennial average rate. The ratio of men invalided in the Artillery was 13·81 per 1,000, in the Engineers 5·52, in the Infantry 16·88, and in other corps *nil.* Of the men invalided 1, or 10·87 per 1,000, was under 20 years of age, 17, or 20·07 per 1,000, were between 20 and 25 years, 4, or 9·62, were between 25 and 30, and 1, or 4·06 per 1,000, was over 30 years of age. As to service in the Command, 12 men, or 21·20 per 1,000, were in their first year, 10 men, or 13·46 per 1,000, were in their second, and 1 man, or 5·59 per 1,000, was in his third year. The causes of invaliding were secondary syphilis 4 cases, epilepsy 3, tubercular diseases 3, mania 2, and anæmia, melancholia, keratitis, valvular disease of heart, thrombosis, cystitis, ostitis, sycosis, ulcer, cicatrices from burns, and sprain of the cervical vertebræ, one case each.

There were 15 men from the Command discharged during the year as medically unfit for further service, the equivalent ratio being 9·37 per 1,000, which is fractionally above the previous year's rate but below the average for the preceding ten years by 2·53. The causes of discharge were as follows:—epilepsy 3 cases, mania 2, synovitis 2, and tubercle of the lung, osteoarthritis, melancholia, thrombosis, phthisis, sycosis, ulcer, and sprain, one case respectively.

OFFICERS.—The average strength was 66, and there were 25 cases of sickness, equal to a ratio of 378·8 per 1,000, as compared with 390·6 in the previous year. The admissions included 6 for influenza, and 2 each for gout, sore throat, obstruction of intestines and inflamed bursa. There was one case of dysentery in an officer who had just arrived from Bermuda, and single cases of other disorders. No death occurred, but 2 officers were invalided, one for piles and one for cystitis.

WOMEN.—In an average strength of 125 there were 56 admissions, the equivalent ratio being 448·0 per 1,000, as compared with 125·0 in 1896. The cases included 8 of throat affections, 7 of influenza, 5 of tubercular affections, 4 of dyspepsia, 3 of debility, etc. There was no death.

CHILDREN.—There were 139 admissions and 3 deaths in an average strength of 248. The ratio of admission was 560·5 per 1,000, which is higher than that for the previous year by 462·5, the death rate, 12·10 per 1,000, being lower by 19·27. Among the cases were 35 of bronchitis, 20 of throat affection, 14 of chicken pox, 7 of dyspepsia, 6 of diarrhœa and 5 each of inflammation of glands and simple continued fever. The deaths were due to immaturity at birth, infantile eclampsia, and diarrhœa.

The increase in the admission rate amongst women and children is attributed to the fact that greater attention was paid to the recording of all cases of sickness treated, however trivial.

VACCINATION.—Of arm-to-arm vaccinations there were 7 revaccinations amongst the men, and 4 amongst the women, all being successful. From preserved lymph there were 59 primary vaccinations amongst children, 20 being failures. Of re-vaccinations 22 were amongst the men, with 18 failures, 3 amongst the women, with 1 failure, and 3 amongst the children, all being failures. The large number of failures is attributed to the age of the lymph, which, it is noted, could not always be used as soon as received.

SANITARY CONDITIONS.

The Principal Medical Officer (Surgeon-Colonel W. McWatters) notes that the ventilation in the men's rooms of Wellington Barracks is unsatisfactory, and that the ablution accommodation is also insufficient. When the storm sashes are placed over the windows in winter, the men's attics are said to be unbearably close. In the Glacis barracks the chief defects noted are in the old pattern urinals and in the unsatisfactory bath accommodation. At the military prison the warder's quarters are considered unsuitable and the khaki uniform issued to the warders is not considered to be well adapted to the climate. At the station hospital the chief requirement noted is a steam disinfecting apparatus.

Canada.

The following sanitary improvements have been effected during the year :—

A block of thirty separate cells was erected at Melville Island Prison, and the old Association Room has been converted into a barrack room.

Two windows were cut through the dark end of No. 21, Casemate Barracks, Citadel. Improved hot water arrangements and new baths were provided for ablution room, South Barracks.

Slate benches were fixed, and concrete floor laid in the ablution room at Melville Island ; where also a new well was sunk, and water laid on to the buildings from galvanized iron tanks, into which the water is pumped. Four baths were renewed in ablution rooms, Wellington Barracks. Slate benches and a new boiler were fixed in ablution room, R.A. Park. Slate benches were fixed, a drain relaid, and water supply improved in the Cavalier ablution room in Citadel. The drains from South and Pavilion Barracks were connected with the new system city sewers. Slate or Doulton ware urinals were substituted for the old zinc lined wooden urinals at the outlying forts.

The painting of the Station Hospital at Halifax with "Duresco," inside and out, has been completed ; electric light has been installed, and will be used instead of gas from 1st January, 1898 ; the water closets in the north annexe were changed from the "Jennings" to the "pedestal pan and flush tank" system, and the drain from the surface gully, near the pack store, was trapped.

At Victoria, B.C., new latrines have been completed, and a discharge pipe is in course of construction, emptying into the sea, east of the old magazine. A new non-commissioned officers' room has been added to the canteen.

A gymnasium exists and regular classes have been formed for training ; these exercise a very beneficial effect on the health of the men.

A company of the 1st Battalion Royal Berkshire Regiment was stationed at Fredericton, New Brunswick, from 1st April to 15th September, and the health of the men is reported to have been very good there.

VI.—ON THE HEALTH OF THE TROOPS SERVING IN BERMUDA.

SICKNESS AND MORTALITY.

Bermuda.

The average strength of warrant officers, non-commissioned officers and men serving in the Command during the year was 1,521, and the garrison throughout the year was composed of No. 3 Company, Western Division, Royal Artillery, Nos. 27 and 36 Companies, Royal Engineers, detachments Army Service Corps, Medical Staff Corps, Army Ordnance Corps, and Garrison Staff.

The arrivals during the year were No. 8 Company, Southern Division, Royal Artillery, and the 2nd Battalion Worcestershire Regiment, both from Malta, on October 18th.

No. 19 Company, Western Division, R.A., and the 2nd Battalion Leinster Regiment, left for Halifax, N.S., on the 19th October.

The following table shows the admission, mortality and invaliding rates, &c., among the troops in the Command.

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids Sent Home.	Invalids finally Discharged.	Constantly Sick.
1,521	687	16	1	17	16	17	40·64	451·7	11·18	10·52	11·18	26·72

The admission and constantly sick rates have declined by 19·1 and ·14 respectively, in comparison with the previous year, and by 107·5 and 2·86 in comparison with the average rates for the preceding ten years. The mortality rate is higher than in 1896 by 5·41 and than the average rate by 1·11 per 1,000.

The average sick time to each soldier was 9·75 days, which is shorter by a fraction than in the previous year, and by 1·05 days than the decennial average period. The average duration of each case of sickness was 21·59 days, being longer than the corresponding period in the previous year by ·71 of a day and than the average for the ten years 1887–96 by 2·28 days.

In Abstract XXVI is a table showing these health statistics for the different corps which served in the Command during the year. Omitting detachments of small average strength and the company of artillery which arrived in October, the highest admission and constantly sick rates were 729·7 and 42·64 per 1,000, in No. 3 Company, Western Division, R.A., and the lowest 213·3 and 10·13 respectively, in No. 27 Company, Royal Engineers. The latter company also furnished the lowest admission and constantly sick rates in 1896. Of the deaths in the Command, 10, or 13·91 per 1,000, occurred in the 2nd Leinster Regiment, 2, or 60·60 per 1,000, in No. 8 Company, Southern Division, R.A., 2, or 8·89 per 1,000, in the 2nd Worcestershire Regiment, 1, or 43·48 per 1,000, in the District Establishment, R.A., and 1, or 10·31, in No. 36 Company, Royal Engineers.

Bermuda.

As to influence of age on sickness and mortality, the admission rate among men under 20 years of age was 916·7 per 1,000, among men between 20 and 25 years 478·0, among men between 25 and 30 years 419·6, and among men over that age 267·1, the ratios following the same sequence as that observed in the preceding year. Of the deaths 9, or 9·89 per 1,000, occurred among men between 20 and 25 years, 5, or 11·65, among men between 25 and 30, and 2, or 13·69 per 1,000, among men of more than 30 years of age. According to length of service in the Command, the admission rate for men of less than one year's service was 491·4 per 1,000, for men in their second year 443·6, for men in their third year 465·5, and for those who had been more than three years in the Command 210·5. In 1896 the highest ratio was also among men in their first year, and the lowest among those with more than three years in the Command. Of the deaths, 4, or 7·68 per 1,000, occurred among men in their first year, 10, or 14·45 per 1,000, among men in their second year, and 2, or 26·31, among men who had been more than three years in the Command.

The admissions, deaths, &c., according to the different sections of disease, will be found in the table given in Abstract V.

GENERAL DISEASES.—There were 4 cases of *influenza.*

Enteric fever was the cause of 34 admissions and 7 deaths, equal to ratios of 22·4 and 4·60 per 1,000, which are higher than those for 1896 by 2·9 and 1·72, but lower than the corresponding average ratios for the preceding ten years by 14·4 and 1·90 respectively. The percentage of mortality to attacks was 20·6, as compared with 14·8 in the previous year and 17·7 during the ten years 1887–96. Of the men attacked 2, or 55·5 per 1,000, were under 20 years of age, 20, or 22·0 per 1,000, were between 20 and 25 years of age; 9, or 21·0 per 1,000, were between 25 and 30 years of age; and 3, or 20·5 per 1,000, were men of over 30 years of age. Three of the deaths, or 3·30 per 1,000, were among men between 20 and 25 years of age; 3, or 6·99 per 1,000, among men between 25 and 30; and 1, or 6·85 per 1,000, among men of over 30 years of age. As to service in the Command, 13, or 25·0 per 1,000, of the men attacked were in their first year; 13, or 18·8 per 1,000, in their second; 3, or 12·9 per 1,000, were in their third; 4, or 83·3 per 1,000, in their fourth year, and 1 man, or 35·7 per 1,000, had over four years' service in the Command. Mortality was at the rate of 3·84 per 1,000 among men in their first year of service, dependent on 2 deaths; 4 deaths, or 5·78 per 1,000, occurred among men in their second year of service, and 1 death, or 71·43 per 1,000, occurred among men of between 5 and 10 years' service in the Command.

The great diminution in the number of cases of enteric fever which was recorded in 1896 was not maintained during 1897, but it is stated that the increase in the number of admissions is accounted for by the fact that the disease was more rife than in 1896 amongst the civil population of Hamilton City, which is only about a mile distant from the barracks at Prospect where most of the cases amongst the troops occurred.

The measures adopted for the prevention of the disease, referred to in the Report for the previous year, were still carefully carried out. Amongst other measures for preventing a predisposition to enteric fever, the Senior Medical Officer lays special stress upon the necessity of good ventilation. "Too much stress," he writes, "cannot be laid on this precaution as a preventive measure against enteric fever attacks whether in this Command or elsewhere. I have often observed that outbreaks of the disease have occurred amongst apparently healthy men soon after their arrival in camp from quarters, and I could account for them in no other way than their being predisposed to the attacks by the debilitating influence of the impure air of tents. The cubic capacity of a bell tent, for example, is about 600 cubic feet only. In one of these perhaps 8 or more men are accommodated, and if the nights are cold or wet, it is closely shut up, its only means of ventilation being the small flap openings at the top which permit of little or no exchange between the foul air inside and the fresh without. To obviate this I invariably recommend that in all kinds of weather the doors of the tent should be left open as far as practicable by night as well as by day."

No cause for any of the cases can be definitely assigned, but in ten

Bermuda.

instances it was ascertained that the men, before admission, had drank water which was obtained from questionable sources; in one case the patient contracted the infection while in attendance upon a case of the disease, and in another, the drains of the quarters where it occurred were in an insanitary state through being choked by roots of trees gaining entrance into them.

It is observed that enteric fever is endemic in Bermuda, because of its system of sewage disposal, by means of cesspools in close proximity to underground tanks in nearly every habitation. On this point the Senior Medical Officer writes: "Most soldiers from time to time obtain drinking and aerated waters from the small houses of the coloured population scattered about the island in all directions, and it is, I think, largely from these sources that infection starts, although the aerial communication of the poison must not be lost sight of, as it appears to me that the dried excreta in the form of dust has been in some instances the *materies morbi*, especially in connection with the water catches." These water catchment areas, mostly in Prospect, are open to the reception of débris of all kinds, blown by the high winds. Dessicated excreta are supposed to find their way thither from the roads in the vicinity of the barracks, on to which the contents of the night soil carts have been observed to spill.

The cases were distributed as follows; at Prospect 30 cases, or 37·5 per 1,000; at St. George's 1 case, or 2·1 per 1,000, and at Watford 3 cases, or 11·6 per 1,000.

There were 19 admissions for *simple continued fever* or a ratio of 12·5 per 1,000, which is below the previous year's and decennial average rates by 2·6 and 12·4 respectively. 11 of the cases occurred at Prospect, 7 at Watford, and 1 at St. George's. *Dysentery* was the cause of a single admission.

Malarial Fevers gave only 2 admissions, both due to ague, and doubtless contracted elsewhere, as malarial fevers are almost unknown in Bermuda.

For *tubercular diseases* there were 8 admissions and 4 deaths, the latter including that of an invalid who died in England, and all were due to tubercular disease of the lung. It is stated that this affection runs a very rapid course in Bermuda. The admission ratio, 5·3 per 1,000, is fractionally higher than in 1896, and 3·2 higher than the average rate.

Venereal Diseases.—There were 11 admissions for *primary syphilis*, equal to a ratio of 7·2 per 1,000, which is higher than that for the preceding year by 5·0. There was no admission for soft chancre. *Secondary syphilis* with 21 admissions gave a ratio of 13·8 per 1,000, which is above that for 1896 by 1·5 but below the average rate by 2·7. *Gonorrhœa* caused 34 admissions, the ratio, 22·4 per 1,000, being higher than in 1896 and in the preceding ten years by 2·9 and 3·1 respectively. Including all forms of venereal disease the total admission ratio was 43·4 per 1,000, which is higher than the corresponding ratio for the previous year by 6·6, but lower than the decennial average rate by 9·6.* The increase in the admission rate as compared with that for 1896 is accounted for by the fact that on the arrival of the regiment in relief from Malta, in October, several of the men were found to be suffering from venereal disease.

Parasitic Diseases.—There were 27 admissions, of which 25 were for scabies. For *alcoholism* 17 admissions are returned, the ratio, 11·2 per 1,000, comparing favourably with 21·6 per 1,000 in 1896. There was no case of delirium tremens.

For *rheumatism* there were 27 admissions or a ratio of 17·7 per 1,000, which is in excess of that for the previous year by 3·3, but fractionally below the average. No case of rheumatic fever is recorded. *Debility* caused 10 admissions, the ratio being 6·6 per 1,000, which is above the preceding year's rate by ·8, but below the average by 2·8. The admissions returned under the heading of *other general diseases* comprised 9 for non-malignant new growth and 3 for anæmia.

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* There were 2 admissions for ulcer of penis, of non-venereal origin, with ·03 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 44·7 *and 4·86 respectively.*

LOCAL DISEASES.—*Diseases of the Nervous System* caused 6 admissions, equal to a ratio of 4·0 per 1,000, which is below the previous year's and average rates by 1·8 and 4·5 respectively. The cases were, 2 each of neuralgia and melancholia, one of paralysis and one of mental stupor. *Bermuda.*

Diseases of the Eye with 24 admissions gave a ratio of 15·8 per 1,000, which is lower than that for 1896 by 3·0, but higher by 2·9 than the average rate. 16 of the cases are returned as conjunctivitis.

Diseases of other Organs of Special Sense with 14 admissions, or 9·2 per 1,000, show a decrease of 3·1 as compared with the previous year, 9 of the cases being cases of inflammation of the external meatus.

Diseases of the Circulatory System gave a ratio of 6·6 per 1,000, which exceeds that for 1896 by 5·2, but is 1·0 below the decennial average ratio. Of 10 admissions, 5 were for valvular disease and 3 for disordered action of the heart.

Diseases of the Respiratory System caused 25 admissions, equal to a ratio of 16·4 per 1,000, which is below the previous year's ratio by 1·6 and the average rate by 8·1. There were 15 cases of bronchitis, 6 of pneumonia, 3 of pleurisy, and 1 of spasmodic asthma. One death occurred from pneumonia.

The admissions for *diseases of the digestive system* were 96 in number, and included 29 for affections of the mouth and throat, 27 for diarrhœa, 17 for dyspepsia, 10 for hepatic disorders, and 4 each for enteritis and hernia. The ratio was 63·1 per 1,000, as compared with 71·4 in 1896 and 101·3, the average rate for the ten years 1887–96.

Diseases of the Lymphatic System caused 8 admissions or 5·3 per 1000, which is above the rate for the previous year by 3·1, but 4·0 below the average. There was only one admission recorded under the heading of *urinary affections* as compared with 6 in the preceding year. *Diseases of the generative system* accounted for 15 admissions, of which 4 were for hydrocele and 3 for orchitis, the ratio 9·8 per 1,000, being higher than in 1896 by 1·1, but lower than the average by 5·4. For *diseases of the organs of locomotion* there were 18 admissions, 15 being for synovitis. The ratio was 11·8 per 1,000 as compared with 10·8 in the previous year and 9·1 the average rate. 39 admissions or 25·6 per 1,000 are shown for *diseases of the connective tissue*, the ratio being lower than the previous year's and average rates by 11·2 and 6·1 respectively. *Diseases of the skin* caused 44 admissions, of which 12 were for ulcers, 11 for whitlows, 10 for boils, and 7 for eczema.

INJURIES.—Under *general injuries* 3 admissions are returned, viz.: one each for burns, sunstroke and suffocation from submersion. The case of sunstroke proved fatal and occurred in August during a march in full marching order from Warwick Camp to Prospect, the temperature being 87·3° F., and the percentage of moisture 76. It is stated that such cases are very rare in Bermuda, no similar case having occurred since August, 1881, when a fatal case of sunstroke was recorded. The case was characterized by general convulsions, a temperature of 108·5° F. in the axilla, and cardiac failure, the postmortem examination showing deep congestion of the choroid plexus and membranes of the brain. There were 2 men drowned through a boating accident.

For *local injuries* there were 155 admissions and 2 deaths, the latter being due in one case to fracture of spine and in the other to fracture of skull, caused by a fall in each instance. The total admission rate for injuries was 103·9 per 1,000, as compared with 112·5 in 1896 and 106·9, the average rate for the preceding ten years. As is usual, wounds, contusions and sprains caused most of the admissions.

One interesting case of local injury occurred at St. George's, where a private of the 2nd Battalion Leinster Regiment was hit by a Morris tube bullet at a distance of 45 yards in the left lumbar region, the wound being in the back between the 10th and 11th ribs. There was no wound of exit, and the position of the bullet could not be traced. Injury to the left kidney was indicated by blood in the urine from the date of injury (30th March) to 11th April, when the symptoms disappeared. No operation was undertaken to remove the bullet and the man was discharged to duty on 30th April, remaining at duty till he left Bermuda with his battalion in October.

Bermuda.

INVALIDING.—The number of men sent home as invalids was 16, being in the ratio of 10·52 per 1,000, which is below the previous year's rate, and the decennial average by 3·18 and 2·13 respectively.

The invaliding ratio in the Royal Artillery was 3·04 per 1,000, in the Royal Engineers 5·81, and in the Infantry 13·74 per 1,000.

With regard to age 13 men, or 14·29 per 1,000, were between 20 and 25 years of age, 2 men, or 4·66 per 1,000, were between 25 and 30 years of age, and 1 man, or 6·85 per 1,000, was over that age. As to service in the Command, 6 men, or 11·52 per 1,000, were in their first year, 9, or 13·01 per 1,000, were in their second year, and 1 man, or 4·31 per 1,000, was in his third year in the Command.

The causes of invaliding were :—tubercle of lung 3 cases, anæmia and valvular disease of the heart, 2 cases each, and one case each of debility, melancholia, aural disease, bronchitis, spasmodic asthma, necrosis of jaw, hernia, fistula in ano, and periostitis.

There were 17 men discharged the service as medically unfit during the year, the ratio being 11·18 per 1,000 as compared with an average rate of 8·14 for the previous ten years. In 1896 there was only one man finally discharged as an invalid. The causes of discharge were :—tubercle of lung, 6 cases, melancholia 2, dementia 2, and one case each of secondary syphilis, paraplegia, hæmorrhage of lung, phthisis, hernia, fistula in ano, and Bright's disease.

OFFICERS.—In an average strength of 67 there were 20 attacks of illness, the admission rate being 298·5 per 1,000, which is lower than in the previous year by 209·7. Among the cases treated were 3 of influenza, 3 of debility, and 3 of enteritis. There were two deaths, one from drowning, the result of a boating accident, and one from gunshot wound, self-inflicted during temporary insanity. Two officers were invalided, one on account of ague and one for debility.

WOMEN.—The average strength was 112, and 64 cases of sickness are recorded. The admission rate was 571·4 as compared with 863·6 in 1896. One case of enteric fever occurred, and among other cases treated were 14 of debility and 6 of bronchitis. One death occurred from fracture of the skull, caused by a blow

CHILDREN.—There were 126 cases of sickness and 5 deaths in an average strength of 242. The admission rate was 520·7 and the death rate 20·66 per 1,000, both being lower than corresponding ratios in the previous year by 188·2 and 25·75 respectively. The cases included 32 of bronchitis, 19 of diarrhœa and 12 of simple continued fever, among the remainder being one admission for enteric fever. The deaths were due to debility, meningitis, eclampsia, enteritis and diarrhœa, one each.

VACCINATION.—Of 66 primary vaccinations and 11 re-vaccinations among the children 45 of the former and 9 of the latter were failures. Only one primary vaccination is recorded amongst the men, which was successful, but of 9 re-vaccinations 4 were failures. All the above were performed with preserved lymph, there being no arm-to-arm vaccinations during the year. The large percentage of failures is attributed to deterioration of the vaccine lymph from climatic causes.

SANITARY CONDITIONS.

Amongst the chief sanitary improvements effected during the year, the Senior Medical Officer, (Brigade-Surgeon-Lieut.-Colonel G. D. N. Leake), notes that the water carriage system of sewage disposal and the drainage scheme for removal of foul water at St. George's have been practically completed and the beneficial effect is already perceptible on the troops stationed there. The system is flushed by automatic flushing tanks supplied from a reservoir filled with water pumped up from a deep well. The almost total disappearance of enteric fever from this garrison is noteworthy, as compared with the garrison at Prospect and with the number of cases at St. George's in previous years. At Prospect, the water carriage system has been only partially introduced, as an experiment, the chief difficulty being apparently the supply of water for flushing. Sea-water, however, could be made available for this purpose. At Lodge Point (Boaz and Ireland Island Station), there is also a water carriage system, but elsewhere throughout the Command dry earth latrines are in use. The married quarters at Prospect have been provided with slop sinks, connected with the main drains, for the disposal of night soil, and a marked sanitary improvement has been effected. A new road has also been constructed to avoid the necessity of night soil carts, from the Royal Engineer and married quarter latrines, passing by the married quarters. Steps were being taken to improve the ventilation of the permanent barracks, and arrangements were made for the admission of cases of infectious disease amongst the women and children at Prospect to the Civil Cottage Hospital, where they are treated by Army Medical Officers. At the Station Hospital, Prospect, a covered way was constructed between the kitchen and the wards, and a re-appropriation of accommodation effected during the year was satisfactory. At Boaz, the space between the floors and surface soil of the Clarence Barracks was provided with new ventilators; and the kitchen, urinal and latrine accommodation was increased to meet the requirements of the increased garrison. The light and ventilation of the casemate barracks in Ireland Island were much improved by enlarging the windows; and the married quarters were vacated, on the ground that the site was unsuitable. The roof of the Station Hospital, Watford, was repaired and the ventilation of the wards improved. Throughout the Command sanitary ash-pits were provided, and there were in addition numerous minor improvements at all the stations.

Amongst the general sanitary defects in the Command, special stress is laid upon the insanitary methods of sewage disposal in civil habitations, (as already noted under the heading of enteric fever), and upon the risks of water pollution by the existing system of underground tanks and underground earthenware water-pipes. Both at Prospect and St. George's, it is noted that the latter are very apt to get broken from the growth of oleander roots, subsidence of ground and other causes. In several cases where these pipes were uncovered they were found broken or blocked. The Senior Medical Officer consequently urges that new tanks should be constructed above ground, and that underground earthenware pipes should be replaced by iron pipes. Amongst other general remarks, it was noted that there was a scarcity of vegetables, attributed to the small supply from the islands themselves and to the tax upon imported vegetables; and that a portable steam disinfecting apparatus for use in the Command is desirable. Amongst strictly local conditions, the principal defects noted are as follows. At Prospect the system of supplying water to baths and lavatories leads to deficient supply, the kitchens are old and small, the urinals require enlarging, the married quarters are old and too close together, and the wooden huts dilapidated. Refuse has accumulated under these huts, but was partially cleared away in 1897. A wash-house and drying-room are considered very necessary for washing khaki clothing and drying in wet weather. At the Station Hospital, Prospect, the process of pumping water to supply latrines, lavatories, &c., by manual labour is alluded to as extremely tedious, and it is suggested that the work could be done more satisfactorily by a small windmill. The hot water system was defective, and a new system is under construction. At St. George's the married quarters are still unsatisfactory, some families having one room only. The want of a gymnasium and of a small isolation ward is felt at this station. At Boaz, the water supply, owing to increase of garrison, was scarce and was supplemented by water conveyed in water carts from tanks in the vicinity. No insanitary conditions are noted in connection with Warwick Camp, and the precaution referred to in the report for 1896 were again carried out with apparent beneficial effect upon the health of the troops.

VII.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST INDIES.

Sickness and Mortality.

I.—European Troops.

West Indies. The average strength of the troops serving in the West Indies during the year was 1,350. Of these, 767 were stationed in the Barbados Command and 583 in Jamaica. The force in the Barbados Command throughout the year consisted of the District Establishment, Royal Artillery, a small detachment of the Royal Engineers, and detachments of the Army Service, Medical Staff, Army Ordnance Corps, &c. No. 23 Company, Western Division, Royal Artillery, and the head quarters and five companies of the 1st Battalion Liverpool Regiment served in the Command until November, when they proceeded to South Africa on relief by No. 1 Company, Western Division, Royal Artillery, and a wing of the 1st Battalion Royal Berkshire Regiment, both from Canada. In Jamaica, No. 14 Company, Western Division, Royal Artillery and a detachment of the 1st Battalion Liverpool Regiment were relieved in November by No. 22 Company of the same division from Malta and the remainder of the 1st Battalion Royal Berkshire Regiment, the only portions of the garrison which served throughout the year being the detachments of Royal Engineers, Army Service, Medical Staff, and Army Ordnance Corps. The stations occupied in the Barbados Command were Barbados and St. Lucia, with an average strength of 503 and 264 respectively, and in Jamaica, Newcastle with an average strength of 323, Port Royal with 126, and Up Park Camp with 134.

The following table shows the admission, mortality, invaliding rates, &c., among the troops in each division, as well as of those in the West Indies as a whole.

1897.	Average Strength.	Admissions.	Deaths.			Invalids.	
			In the Command.	Of Invalids.	Total.	Sent Home.	Finally discharged.
Barbados Command.	767	1,248	4	—	4	28	17
Jamaica	583	513	15	1	16	14	11
West Indies ..	1,350	1,761	19	1	20	42	28

(*continued*)

West Indies.

1897.	Average constantly Sick.	Ratio per 1,000 of Strength.				
		Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.
Barbados Command ..	81·04	1627·1	5·23	36·50	22·16	105·66
Jamaica	36·41	879·9	27·44	24·01	18·87	62·45
West Indies	117·45	1304·4	14·81	31·11	20·74	87·00

In the Barbados Command, an increase of 180·6 per 1,000 has occurred in the admission rate, of 1·31 in the death rate, and of 13·55 in the constantly sick rate, as compared with the year 1896. The average sick time to each soldier was 38·56, and the average duration of each case of sickness 23·70 days, which are longer than corresponding periods in the previous year by 4·85 days and ·39 of a day respectively.

In Jamaica, the admission, death and constantly sick rates are higher by 62·1, 17·95, and 3·99 per 1,000 respectively. The average sick time to each soldier, 22·79 days, is longer than in 1896 by 1·39 days, but the average duration of each case of sickness, 25·91 days, is shorter by a quarter of a day.

Taking the West Indies as a whole, the admission, death and constantly sick rates are higher than in the previous year by 114·2, 8·62 and 8·60, and than the average ratios for the preceding ten years by 185·1, 6·38, and 22·52 per 1,000 respectively. The average sick time to each soldier was 31·75 days, and the average duration of each case of sickness 24·34 days, the former being longer than in 1896 by 3·06 and than the decennial average period by 8·21 days, and the latter by ·23 of a day and 3·26 days respectively.

In Abstract XXVI is a table showing these health statistics for the various corps which served in the West Indies during the year. The admission and constantly sick rates in No. 23 Company, Western Division, Royal Artillery, at Barbados and St. Lucia, were 1384·0 and 95·20, and in No. 14 Company at Jamaica, 935·0 and 63·90 per 1,000 respectively. There were 2 deaths in the former, or a ratio of 16·00 per 1,000; the only death in the latter was an invalid who died after leaving the Command, the ratio being 8·13. In the headquarters of the 1st Battalion Liverpool Regiment, in Barbados and St. Lucia, the admission, death and constantly sick rates were 1799·2, 1·97, and 121·54 per 1,000, and in the wing at Jamaica, 934·9, 6·85, and 76·06 respectively.

With reference to the influence of age on the sickness and mortality, it is found that the admission rate among men under 20 years of age was 1350·0, dependent, however, upon a small strength; in the age-group 20 to 25 years, which gave the largest strength, the ratio was 1670·3, as compared with 1633·0 in 1896; among men between 25 and 30 years, the admission rate was 1026·5 as compared with 981·3, and among men of 30 years of age and upwards 710·8 as compared with 372·8 in the preceding year. The mortality rate was 9·46 among men between 20 and 25, 8·16 among those between 25 and 30, and 54·22 among men of 30 years of age and upwards. There was no death amongst men under 20 years of age. With regard to length of service in the West Indies, the ratio of admission was 1032·7 per 1,000, among men in their first year, 1683·9 among those in their second year, 931·5 among those in their third year and 797·9 among men who had been three years or longer in the Command. In the previous year the highest ratio was among men in their first year, and the next highest among men in their third year. The mortality rate among men in their first year was 14·29 per 1,000, among men in their second year 8·06, and among men in their third year 47·94. There was no mortality among men of more than three years' service in the West Indies.

West Indies.

In Abstract VI will be found the sickness, mortality, &c., arranged according to the various sections of disease.

GENERAL DISEASES.—*Eruptive fevers.*—There were 35 admissions for dengue at Barbados, as against 9 in 1896 and none in 1895. The ratio of admission was 25·9 per 1,000. The men attacked were mostly young and unseasoned soldiers.

For *enteric fever* there were 5 admissions and 2 deaths, one of the latter being that of an invalid. The admission rate was 3·7 per 1,000, which is higher than that for the previous year by ·6, but lower than the average rate for the preceding ten years by 6·2. The death rate was 1·48 per 1,000, as compared with *nil* in 1896 and with 2·61, the average rate. All the cases occurred in Jamaica, three at Up Park Camp, one proving fatal, and two at Newcastle. In the fatal case the man is said to have contracted the disease in the Kingston Penitentiary while undergoing imprisonment, but the remaining cases are attributed to drinking impure water.

Other Continued Fevers.—There were 165 admissions, all for simple continued fever, of which 145 occurred in Barbados, 5 in St. Lucia, and 15 in Jamaica, the ratio, 122·2 per 1,000, being higher than that for 1896 by 52·6 and than the decennial average rate by 35·1. The cases at Barbados are stated to have been of a mild type, and were attributed to the combined effects of the sun and alcohol.

Dysentery.—There were 20 admissions and 1 death, all in Jamaica. The admission rate, 14·8 per 1,000, is above that for 1896 and the average rate by 12·5 and 9·2 respectively. At Newcastle, there were 13 admissions. The time of their occurrence coincided with the onset of the rainy weather.

Yellow Fever caused 16 admissions and 10 deaths, equal to ratios of 11·9 and 7·41 per 1,000, as compared with 1·8 and ·84 respectively, the average ratios for the preceding ten years. There was no sickness from this cause in 1896, the last occasion on which yellow fever cases occurred amongst the troops in the West Indies being in 1895 in St. Lucia, and in 1894 in Jamaica.

During the latter half of the year 1897 the disease was recognised as being epidemic in Jamaica, but no cause for the outbreak is recorded beyond the general statements that the soil in Kingston was being disturbed in connection with the new drainage scheme; that the sanitary state of the town was very unsatisfactory, and that the climatic conditions (long drought, followed by torrential rains) were favourable. The disease amongst the civilian population was not confined to Kingston, but attacked several parts of the island widely distant from one another. Amongst the troops cases occurred at all the military stations, namely, Newcastle, Up Park Camp, and Port Royal, and the disease attacked non-European, as well as European troops, though to a much less extent, the only class exempt being the children. The cases at Newcastle were 4 in number. All of these cases had come up from Kingston (Up Park Camp) during a period lasting from one to ten days before the disease developed itself, and no infection spread in the station from them. Three out of the four cases died.

At Up Park Camp there were 12 cases, (1, not recorded as an admission, having died out of hospital), and 7 deaths among the European warrant officers, non-commissioned officers and men, and 6 cases and 2 deaths among the non-European troops; 5 cases occurred amongst the officers, 3 proving fatal; and two women of the garrison and the wife of an officer also suffered from the disease, the two former succumbing.*

The cases at Port Royal were one officer (fatal) and one European gunner (recovered). The European garrison, immediately after the occurrence of these cases, was removed to Newcastle.

Of the various corps in garrison the Medical Staff suffered most severely. Out of an average annual strength of 18 warrant officers, non-commissioned officers and men, 2 warrant officers, 1 non-commissioned officer, 2 privates, and 2* women of the corps and one officer's wife were attacked, all, except the last and 1 of the warrant officers, dying.

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* In the case of one of the women, the cause of death has been returned as remittent fever, but it is since believed to have been a case of yellow fever.

The other corps suffered as follows:—1 non-commissioned officer, Army Pay Corps (recovered); 1 non-commissioned officer, 1st Liverpool Regiment (recovered); 2 gunners of the Royal Artillery (1 died, 1 recovered); 5 officers, 1 European warrant officer, and 6 men of the West India Regiment (3 of the officers and 2 of the men died); 1 officer (died), and 3 non-commissioned officers (2 died), of the Royal Engineers; and 1 non-commissioned officer (recovered), and 3 men (all died), of the 1st Royal Berkshire Regiment.

No reason is assigned for the large amount of sickness amongst the Medical Staff Corps. None of the men attacked had been orderlies over other cases of yellow fever and none of them (expect one of the warrant officers) had recently arrived in the command. As regards the cases generally, there was an impression that the quarters of the European Staff Block at Up Park Camp were the first to become infected, the first case in the Camp being a non-commissioned officer living in the quarters, who died in them without reporting sick. Two other cases, occurring about the same time, also had quarters in this block, and a 4th case (occurring 8 days later), occupied a room near it. The quarter was vacated and disinfected, and no further cases occurred in Up Park Camp till the arrival of the "Avoca," on the 11th of November, with the 1st Royal Berkshire Regiment and details.

It was necessary for a small number of these arrivals to remain on various duties in the plains, and all the new arrivals attacked, namely, 4 of the Royal Berkshire Regiment, 1 of the Royal Artillery, and 1 of the Medical Staff Corps had been so employed, no cases occurring amongst the men sent direct to the hills.

The monthly distribution of the cases, amongst Europeans in garrison was as follows:—

In August 1 woman at Up Park Camp (recorded as remittent fever), and 1 non-commissioned officer, Medical Staff Corps at Newcastle, the latter developing the disease on the date of his arrival from Up Park Camp. Both cases were fatal. In September, 3 cases at Up Park Camp and 1 at Newcastle (a warrant officer, M.S.C., who died on the 10th day after his arrival in the station from Up Park Camp). In October, 1 officer and 1 man, both at Port Royal. In November, 1 officer (living in the house of the General Officer Commanding, some distance from Up Park Camp), 4 non-commissioned officers and men and 1 woman at Up Park Camp, and 2 amongst the non-commissioned officers and men at Newcastle. One of the last named had been a baggage guard at Kingston from the 11th to 13th November, having arrived in the command on the former date and being transferred to Newcastle on the latter. He was admitted for yellow fever on the 22nd November, *i.e.*, the 12th day after his arrival in the infected area and the 10th day after his departure from it. He died on the 26th November. The other patient at Newcastle had also arrived in the "Avoca" on the 11th November and was stationed at Up Park Camp, as school assistant, till the 22nd November, when he was sent to Newcastle. He was admitted on the 6th November and recovered. All the other cases in November, amongst the non-commissioned officers and men, arrived in the "Avoca," with the exception of one man of the M.S.C., who occupied a room with one of the other cases and developed the disease practically at the same time, both dying within two days of one another.

In December all the cases amongst the European troops, namely, 4 officers and 5 warrant officers, non-commissioned officers and men, occurred in the Up Park Camp Garrison, but two of the officers lived out of camp, and one of the men had been in Isolation Camp at Papine from the 29th November to the 3rd December, when he was brought to Up Park Camp Hospital suffering from the disease. This Isolation Camp had been formed on the 26th November, and all those who had arrived in the "Avoca" on the 11th November and who had been kept on duty in the plains, were sent to it for 14 days' isolation previous to their being located in Newcastle. The case from the Papine Isolation Camp, therefore, had only been some 4 days in camp before the disease developed, and had previously been stationed in Up Park Camp.

In conclusion it may be stated that all the facts that have been submitted regarding the outbreak amongst the troops point to the disease in each case

West Indies.

having been contracted from local *foci*, in or around Kingston, and not from person to person. One other point has been given prominence, namely, the coexistence of a severe outbreak of remittent fever, one medical officer reporting that the attacks of yellow fever were indistinguishable from attacks of remittent fever in their earlier stages, and that in his opinion the former were only malignant forms of the latter.

Malarial Fevers with 167 admissions, gave a ratio of 123·7 per 1,000, which is higher than in the previous year by 34·0, and than the decennial average rate by 71·3. All but two of the cases were returned as remittent fever. In St. Lucia the admissions were 1 for ague and 77 for remittent fever, at Barbados 1 for ague and 3 for remittent fever, and at Jamaica 85 for remittent fever (13 at Newcastle, 36 at Up Park Camp, and 36 at Port Royal). There were two deaths, one at St. Lucia and one in Jamaica, both due to remittent fever. At Barbados and St. Lucia these fevers were of a mild type but showed a marked tendency to recur, and, it is stated, invariably occurred in men of intemperate habits. In Jamaica many of the cases were of a bilious type, difficult in their early stages to distinguish from yellow fever. The blood of the cases occurring in St. Lucia was examined microscopically, and pigmented spheres, crescents, and free pigment detected, but no ex-flagellation of spheres was found. The pyrexia in these cases was continuous for 4 to 6 days, and was accompanied by pains in the lumbar region and frontal headache. Epigastric pain and vomiting were unusual.

Tubercular Diseases caused one admission for lung affection in Jamaica.

Venereal Diseases.—There were 153 admissions for *primary syphilis* in the combined Commands, or a ratio of 113·3 per 1,000, which is higher than that for the preceding year by 34·4. Including soft chancre, for which there were 74 admissions and 5·10 men constantly sick, the admission ratio for primary venereal sores was 168·1 per 1,000, which is below the previous year's rate by 10·5, but above the average by 25·9, the ratio of constant inefficiency, 15·39 per 1,000, being lower in the former comparison by ·59, but higher by 4·17 in the latter. The admission ratio for primary venereal sores in the Barbados Command only was 246·4, and the ratio constantly sick, 22·10, both higher than in 1896 by 14·0 and 1·63 respectively; in Jamaica the admission rate, 65·2, and the constantly sick rate, 6·57, are lower than in the previous year by 35·4 and 2·90. The admissions for *secondary syphilis* in the combined Commands were 129 in number, and 15·06 men were constantly sick, the equivalent ratios being 95·6 and 11·16 per 1,000, which are higher than the previous year's rates by 19·0 and 3·53, and than the average rates by 51·1 and 6·60 respectively. In the Barbados Command the ratios of admission and constantly sick on account of secondary syphilis were 125·2 and 14·86, as compared with 84·8 and 9·62 in the previous year, and in Jamaica 56·6 and 6·28 as compared with 64·5 and 4·72. *Gonorrhœa* caused 195 admissions in the combined Commands, and the constant sickness of 17·25 men, equal to ratios of 144·5 and 12·78 per 1,000 respectively, the admission rate being lower than in 1896 by 14·8, and than the average rate by 9·8, while the constantly sick rate is higher by ·49 and 1·69 in the two comparisons. In the Barbados Command the ratio of admission was 174·7, and that of constantly sick, 15·29, the former being lower by 31·6 and the latter by ·19 than in the previous year; in Jamaica these rates were 104·6 and 9·47, as compared with 91·1 and 7·65 in 1896.

Taking all forms of venereal disease together, the total admission ratio in the West Indies was 408·2, which is below the previous year's rate by 6·3 but above the average for the preceding ten years by 67·2. The total ratio of constant inefficiency on account of these diseases was 39·33 per 1,000 which is higher in the two comparisons by 3·43 and 12·46 respectively.[*] In the Barbados Command alone the total admission and constantly sick rates were 546·3 and 52·25 per 1,000, as compared with 523·5 and 45·57 in the

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[*] There were 10 admissions for ulcer of penis of non-venereal origin (all in the Barbados Command), with ·97 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 415·6 and 40·05 respectively.

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preceding year, and in Jamaica the rates were 226·4 and 22·32 as against 256·2 and 21·84 in 1896.

Under the heading of *parasitic diseases* 19 admissions are returned, of which 13 were for ringworm and 5 for scabies. There was one admission for *pulex penetrans* (jigger) at Newcastle, Jamaica, the eggs being laid in the skin of the feet, causing a troublesome sore. The ratio, 14·1 per 1,000, is below the average rate by 2·5. There were 21 admissions for *alcoholism*, including one for delirium tremens, which terminated fatally. With the exception of a single admission in Jamaica, all occurred in the Barbados Command.

Rheumatism was the cause of 60 admissions, equal to a ratio of 44·4 per 1,000, which is below the previous year's rate by 4·4, but above the average rate by 4·9. No case of rheumatic fever is recorded. All but 7 of the admissions occurred in the Barbados Command.

Debility, with 23 admissions, gave a ratio of 17·0 per 1,000, which is higher than that for 1896 by ·8 and than the average rate by 2·5.

The admissions shown under the heading of *other general diseases* comprised 7 for non-malignant and 2 for malignant new growths, and 1 each for anæmia and congenital malformation.

LOCAL DISEASES.—*Diseases of the Nervous System* caused 13 admissions or a ratio of 9·6 per 1,000, which is above the previous year's rate by 1·1, but below the decennial average rate by 4·0. In the Barbados Command the cases were 10 of neuralgia and 1 of epilepsy, and in Jamaica 1 each of inflammation of nerves and neuralgia.

Diseases of the Eye.—There were 21 admissions, equal to a ratio of 15·6 per 1,000, as compared with 10·8 in 1896 and with 12·0, the average rate for the preceding ten years. The admissions were 19 for conjunctivitis and 2 for iritis, and, of the total, 12 occurred in the Barbados Command. *Diseases of other organs of special sense* gave an admission ratio of 20·0 per 1,000, which is lower than the previous year's rate by 4·0, and than the average rate by 2·4. Of 27 cases 20 were returned as inflammation of the external meatus. Only 7 of the admissions occurred in Jamaica.

Diseases of the Circulatory System caused 17 admissions, or a ratio of 12·6 per 1,000, which is higher than the previous year's rate and the average by 1·0 and 3·0 respectively. In the Barbados Command there were 6 cases of disordered action of the heart, 2 of valvular disease, and 2 of varix, and in Jamaica 2 cases each of disordered action of the heart and varix, and 1 each of valvular disease of the heart, syncope, and thrombosis. One death from valvular disease occurred in Jamaica.

Diseases of the Respiratory System.—There were 24 admissions, the ratio, 17·8 per 1,000, being below the previous year's and average rates by 2·3 and 8·8 respectively. In Jamaica there were 8 cases of bronchitis and 3 of pneumonia, and the admissions in the Barbados Command comprised 5 for bronchitis, 4 for pneumonia, and 2 each for phthisis and pleurisy. No death occurred.

Diseases of the Digestive System were the cause of 147 admissions and 1 death, the admission ratio being equal to 108·9 per 1,000, which exceeds that for 1896 by 7·6 and the average rate for the preceding ten years by 9·1. There were 103 cases in the Barbados command and 44 in Jamaica, the total including 68 of diseases of the mouth and throat, 21 of colic, 19 of dyspepsia, 17 of diarrhœa, and 7 of hepatic disorder. The death, which occurred in Barbados, was due to typhlitis.

Diseases of the Lymphatic System gave a ratio of 45·9 per 1,000, which is lower than that for 1896 by 16·7, but higher than the average rate by 1·7. *Diseases of the urinary system* gave 3 admissions as compared with 4 in 1896. There was one death from disseminated suppurative nephritis at Barbados. *Diseases of the generative system*, with 115 admissions, mostly due to soft chancre and orchitis, gave a ratio of 45·9 per 1,000, which compares favourably with 118·3 in 1896, the average rate being 118·4. *Diseases of the organs of locomotion* caused 19 admissions, equal to a ratio of 14·1 per 1,000, which is below the previous year's rate by 2·1 but above the average rate by 5·0. All but 6 of the admissions were due to synovitis. *Diseases of the connective tissue* with 43 admissions, gave a ratio of 31·9 per 1,000, as

West Indies. compared with 28·6 in 1896, and 40·2, the average rate. *Diseases of the skin* caused 84 admissions, equal to a ratio of 62·2 per 1,000, which differs only fractionally from the average rate. Of the admissions, 61 occurred in the Barbados Command, boils, eczema, and whitlows forming the chief causes of admission.

INJURIES.—157 admissions and 1 death are returned. The admission ratio, 116·3 per 1,000, is lower than that for 1896 by 16·7 and than the decennial average rate by 20·9. The whole of the cases are returned under the heading of local injuries, the most frequent causes of admission being wounds, sprains and contusions. The death was from fracture of skull, the result of a fall at Port Royal.

INVALIDING.—The number of men invalided home from the West Indies was 42, equal to a ratio of 31·11 per 1,000, which is above the corresponding rate in the previous year and the decennial average rate by 11·00 and 10·88 respectively. The invaliding rate for the Barbados Command was 36·50 per 1,000, and that for Jamaica, 24·01, as compared with 26·11 and 11·38 respectively in 1896. Of the men invalided the 1st Liverpool Regiment furnished 34, the Artillery 6, and other corps 2. With regard to age, 28 men, or 44·16 per 1,000, were between 20 and 25 years of age, 10 men, or 20·41 per 1,000, were between 25 and 30 3 men, or 18·07 were over 30, and 1 man, or 16·67 per 1,000, was under 20 years of age. With regard to service in the West Indies, 13 men, or 26·53 per 1,000, were in their first year, 27 men, or 43·55 per 1,000, were in their second year, and 2 men, or 21·28 per 1,000, had been more than three years in residence.

The principal causes of invaliding were secondary syphilis 10 cases, tubercle of lung 5, valvular disease of heart 4, and remittent fever, epilepsy, malignant new growth, disordered action of heart, inflammation of glands, and wound, 2 cases each.

There were 28 men discharged during the year as medically unfit for further service, the equivalent ratio being 20·74 per 1,000, which is higher than that for the preceding year and than that for the ten years 1887–96 by 9·91 and 7·34 respectively. The number of men from the Barbados Command who were discharged as invalids was 17, or 22·16 per 1,000, and from Jamaica 11, or 18·87 per 1,000. The causes of discharge were secondary syphilis and tubercle of lung 5 cases each, remittent fever, epilepsy, aural disease, valvular disease of heart and injuries, 2 cases each, and non-malignant new growth, malignant new growth, neuralgia, disordered action of heart, varix, phthisis, inflammation of lymphatic glands and synovitis, one case each.

OFFICERS.—The average strength of officers was 120, 54 being stationed in the Barbados Command and 66 in Jamaica. The cases of sickness were 48 in the former and 50 in the latter, a total of 98, giving a ratio of 816·7 per 1,000, which is higher than that for 1896 by 16·7. Among the cases treated were 29 of remittent fever and 2 of ague, 9 of simple continued fever, 6 of diarrhœa, 6 of yellow fever, and one of enteric fever, which, along with all the cases of yellow fever, occurred in Jamaica. Five deaths occurred, all at Jamaica, 4 being due to yellow fever and one to remittent fever. Four officers were invalided, one each on account of enteric fever, debility, conjunctivitis and fracture of nasal cartilage.

WOMEN.—In an average strength of 100 there were 102 cases of illness, equal to a ratio of 1,020·0 per 1,000, which is greater than that for 1896 by 54·0. There were two deaths, or 20·00 per 1,000, as compared with 16·93 in the previous year. In the Barbados Command, the strength was 53 and the cases of sickness 38, and in Jamaica the strength was 47 and the cases 64. The principal causes of sickness were debility 43 cases, remittent fever 13, dysentery 8, rheumatism 6, bronchitis 4, and diarrhœa 3. One fatal case of yellow fever occurred in Jamaica, where there was also a death from remittent fever, which was subsequently considered, however, to have been yellow fever.

CHILDREN.—The average strength was 176, 95 being in the Barbados Command and 81 in Jamaica. There were 29 cases of sickness in the

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former Command and 110 in the latter, the total, 139, giving a ratio of sickness equal to 789·5 per 1,000, which is higher by 165·5 than the corresponding rate in the preceding year. There were 3 deaths, all in Jamaica, the ratio, 17·04 per 1,000, being higher than in 1896 by 1·17. The cases included 22 of diarrhœa, 20 of remittent fever, 13 of conjunctivitis, 10 of simple continued fever, 7 of bronchitis and 5 each of measles, sore throat and eczema. The deaths were 2 from diarrhœa and 1 from remittent fever. No case of yellow fever occurred, and it is noted that the cases of remittent fever were much less severe than amongst the adults.

VACCINATION.—In Barbados, of 38 primary vaccinations amongst children 5 were failures. There were 29 re-vaccinations amongst the men, with 17 failures, 11 amongst the women with 4 failures, and 3 amongst the children, all successful. In Jamaica there were 4 primary vaccinations amongst the men and 3 amongst the women, all being successful, and of 18 amongst the children 5 were failures. There were only 3 re-vaccinations during the year, all amongst the men, of which 2 were failures. All vaccinations in both Commands were carried out with preserved lymph.

II.—NON-EUROPEAN TROOPS.

The average strength of non-commissioned officers and men, exclusive of European sergeants, was 1,629, of whom 555 were stationed in the Barbados Command, and 1,074 in Jamaica. The force in the Barbados Command consisted of the St. Lucia Company, Royal Artillery, detachments of the West India Fortress Company, Royal Engineers and 1st Battalion West India Regiment. The stations occupied were Barbados and St. Lucia, average strength 299 and 256 respectively. In Jamaica were the Jamaica Company, Royal Artillery, the West India Submarine Mining and Fortress Companies, Royal Engineers, and the headquarters of the 1st Battalion and the Depôt of the West India Regiment. The stations occupied were Port Royal, average strength 170, and Up Park Camp, 904.

There were no arrivals in the Command during the year, but the 3rd Battalion West India Regiment was formed at Jamaica on 1st November, the headquarters leaving for St. Helena on the 23rd of that month. The headquarters of the 1st Battalion left for West Africa on November 23rd, the remainder of the battalion following at the end of December.

The admission, mortality, and invaliding rates, &c., among non-European troops in each of the divisions, as well as among those serving in the West Indies as a whole, will be found in the subjoined table :

1897.	Average Strength.	Admissions.	Deaths.			Invalids.	
			In the Command.	Of Invalids.	Total.	Sent Home.	Finally discharged.
Barbados Command.	555	504	4	—	4	—	13
Jamaica	1,074	1,123	20	—	20	—	50
West Indies ..	1,629	1,627	24	—	24	—	63

West Indies. *(continued)*

1897.	Average constantly Sick.	Ratio per 1,000 of Strength.				
		Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Average constantly Sick.
Barbados Command ..	31·80	908·1	7·20	—	23·42	57·33
Jamaica	83·93	1045·6	18·62	—	46·55	78·15
West Indies	115·73	998·8	14·73	—	38·67	71·04

Comparing the statistics for the Barbados Command alone with those for the previous year, the admission rate has declined by 99·4, the death rate by 11·46, and the constantly sick rate by 3·13 per 1,000. The average sick time to each soldier was 20·91 days, which is shorter than the corresponding period in the previous year by 1·21 days. The average duration of each case of sickness was 23·03 days, about one day longer than in 1896.

In Jamaica, the admission rate increased by 54·7, and the death rate by 10·54, but the ratio of constant inefficiency declined by 3·01 per 1,000. The average sick time to each soldier, 28·52 days, and the average duration of each case of sickness, 27·28 days, are shorter than in the previous year by 1·18 and 2·70 days respectively.

Taking all the non-European troops in the West Indies together, the admission rate has increased by 2·1, and the mortality rate by 2·93, while the constantly sick rate has decreased by 2·83, as compared with 1896. In comparison with the average rates for the preceding ten years, the admission rate has declined by 162·1 and the constantly sick rate by 3·13, but the mortality rate has increased by 2·81. The average sick time to each soldier, 25·93 days, is longer than in 1896 by 1·11, and than the average corresponding period for the preceding ten years by 1·14 days. The average duration of each case of sickness was 25·96 days, which is shorter than in 1896 by 1·17 but longer than the decennial average period by 2·64 days.

With regard to the sickness and mortality of individual corps in the Barbados Command, the admission rate for the St. Lucia Company, Royal Artillery, was 800·0, that for the West India Fortress Company, Royal Engineers, 941·2, for the detachment of the West India Regiment at Barbados 1057·8, and for that at St. Lucia, 1692·9. There were 2 deaths in the Artillery and 2 in the Infantry, the corresponding ratios being 20·00 and 4·57 per 1,000.

In Jamaica, the Jamaica Company, Royal Artillery, had an admission ratio of 1101·0, and a mortality rate of 30·30, 3 deaths being recorded; the West India Submarine and Fortress Companies, Royal Engineers, gave an admission rate of 615·8 and a death rate of 10·53, there being one death, and the 1st Battalion of the West India Regiment an admission rate of 986·2, and a death rate of 15·71 per 1,000, 9 deaths occurring. There was also a death in the newly formed 3rd Battalion of that Regiment. In the Depôt, West India Regiment, the admission rate was 1263·0, and that of mortality 20·76, dependent upon six deaths.

Taking the troops in the West Indies together, the sickness according to age shows that among men under 20 years of age, the admission ratio was 1574·6 per 1,000, among men between 20 and 25 years of age it was 1319·1; among men between 25 and 30, 661·0, and among men over 30 years of age 653·2 per 1,000. In the previous year the highest ratio was that of men between 20 and 25 years, and the next highest that of men under 20 years of age. There was no mortality among men under 20 years of age; among men between 20 and 25 years of age the ratio was 34·26 per 1,000, dependent on 16 deaths, and among men between 25 and 30 years of age, 12·38, dependent on 8 deaths, no death occurring among men over that age. In the previous year the highest mortality rate was among men between 25 and 30 years of age.

With regard to length of service the admission ratio among men in their first year was 1335·2 per 1,000, among men in their second year 1304·4, among men in their third year 1177·2, and among men over three years' service 589·0. In 1896 the highest ratio was among men in their second year, and the lowest among men in their first year. The mortality rate among men in their first year of service was 16·67, dependent upon 9 deaths; among men in their second year 18·63 per 1,000 (3 deaths); among men in their third year 27·56 per 1,000 (7 deaths), and among men over three years' service 7·42 per 1,000 (5 deaths). In the previous year the highest death rate was among men with more than three years' service and the lowest among men in their first year.

In Abstract VII will be found the sickness, mortality, &c., arranged according to the various sections of disease.

GENERAL DISEASES.—Only one admission is recorded for *eruptive fevers*, a case of cow-pox. There were 4 admissions for *influenza* at Jamaica.

For *enteric fever* 9 admissions and 4 deaths are returned, equal to ratios of 5·5 and 2·46 per 1,000 respectively. There was no case in 1896; while the average rates for the preceding ten years are 3·0 for admissions and 1·37 for deaths. All the cases occurred at Up Park Camp, Jamaica, and are stated to have been very severe; their occurrence is attributed to the carelessness of the men in drinking impure water. The Hope River, which supplies the camp, passes through Gordon Town, and is said to receive the surface drainage and washings of stables there. The non-Europeon troops are warned to use water from the Pasteur filters, but they neglect this precaution and drink water from the ablution taps.

Simple continued fever was the cause of 46 admissions at Jamaica and 37 in the Barbados Command, a total of 83, equal to a ratio of 51·0 per 1,000, which is higher than that for 1896 by 26·7, but lower than the average rate for the preceding ten years by 34·6.

Dysentery caused 77 admissions and 4 deaths, of which all but one non-fatal case occurred in Jamaica. The admission rate, 47·3 per 1,000, is higher than that for the previous year by 17·8 and than the average rate by 34·3. The death rate was 2·46 per 1,000, as compared with *nil* in 1896 and ·15, the average rate.

Yellow Fever.—There were 6 admissions in Jamaica with 2 deaths. Three of the cases were severe, and one was contracted while in attendance on a European who was suffering from the disease. The ratio of admission was 3·7, and that of mortality 1·23 per 1,000. It is noted that the attacks of yellow fever in the non-European troops were less severe than amongst the Europeans, the mortality of the latter being twice as great. Black vomit was present in both the fatal cases. All the cases occurred at Up Park Camp.

Malarial Fevers.—266 admissions are recorded with 6 deaths, the admission ratio, 163·3 per 1,000, being above the previous year's rate and the average rate by 31·5 and 64·5 respectively. Of the cases, 211, or 196·5 per 1,000, occurred in Jamaica, 13 being returned as ague, and 198, 5 fatal, as remittent fever. In the Barbados Command there were 55 cases of remittent fever, all at St. Lucia, where there was also one death, the ratio of prevalence in the Command being 99·1 per 1,000. Remittent fever is regarded as the disease specially affecting the non-European troops in Jamaica.

Tubercular Diseases.—There were 16 admissions and 3 deaths, equal to ratios of 9·8 and 1·84 per 1,000, both being lower than the previous year's rates by 3·3 and 1·44, and than the decennial average rates by 3·3 and 1·27 respectively. With the exception of 3 cases of tubercle of glands, all were cases of tubercular disease of the lungs, the latter accounting for the deaths. 13 of the cases occurred in Jamaica, and the 3 fatal cases in Barbados.

Venereal Diseases.—The admissions for *primary syphilis* were 179 in number, being in the ratio of 109·9 per 1,000, which is below the corresponding rate in the previous year by 1·6 but above the average rate by 7·4. Of the cases 133, or 123·8 per 1,000, were admitted in Jamaica, and 46, or

West Indies. 82·9 per 1,000, in the Barbados Command. Including the sickness from soft chancre, which caused 52 admissions, and the constant sickness of 2·73 men, the admission ratio for primary venereal sores was 141·8, which is lower than the corresponding rate in 1896 and than the average rate for the preceding ten years by 16·9 and 53·8 respectively; the constantly sick rate was 12·18 per 1,000, being lower than in the previous year by 4·05 and than the average rate by 4·79. All the sickness from soft chancre occurred in the Barbados Command, the admission rate for primary venereal sores being 176·6 and the constantly sick rate 12·61, as compared with 192·1 and 16·78 per 1,000 respectively in 1896.

The admissions in the West Indies, as a whole, for *secondary syphilis*, numbered 63, and 8·56 men were constantly sick, being in the ratios of 38·7 and 5·25 per 1,000, which are lower than the corresponding rates in the previous year by 22·3 and 2·19; compared with average rates for the preceding ten years the admission rate is lower by 10·7, but the constantly sick rate is higher by ·16. In Jamaica the admission rate was 32·6 and the constantly sick rate 4·50 per 1,000, as compared with 69·8 and 9·02 in the previous year. In the Barbados Command the ratio of admission equalled 50·4 and the constantly sick rate 6·72 per 1,000, as compared with 44·8 and 4·53 per 1,000 respectively in 1896.

Gonorrhœa caused 175 admissions in all, and 16·08 men were constantly sick with this disease. The admission ratio was 107·4, and the constantly sick rate 9·87 per 1,000. Compared with corresponding ratios in the previous year there is a decrease of 30·3 in the admission rate and of 1·47 in the constantly sick rate; compared with the average rates for the preceding ten years, a decline of 56·4 is observed in the former, and of 1·07 in the latter rate. In Jamaica alone the ratio of admission was 119·2 and the constantly sick rate 11·49 per 1,000, as compared with 147·6 and 13·07 in 1896. In the Barbados Command the admission ratio was 84·7 and the constantly sick rate 6·74 per 1,000, as compared with 119·4 and 8·15 respectively in the preceding year.

Including all forms of venereal disease, the total admission ratio in the West Indies was 287·9 per 1,000, which is lower than the corresponding rate in the previous year by 69·5, and than the average rate by 120·9. The total amount of constant inefficiency on account of these diseases was 27·30 per 1,000, which is lower than the similar rate in the previous year by 7·71, and than the average rate by 5·70. Taking Jamaica alone, the total admission rate for all forms of venereal disease was 275·6, and the total amount of constant inefficiency on this account, 27·94 per 1,000, as compared with 357·9 and 38·01 respectively in the preceding year. In the Barbados Command the total admission rate was 311·7 and the total constantly sick rate 26·07 per 1,000, the corresponding rates in the previous year having been 356·3 and 29·46 per 1,000 respectively.

There were 53 admissions for *parasitic diseases*, or a ratio of 32·5 per 1,000, which is identical with the average rate. Ringworm caused most of the admissions. One case of *alcoholism* is returned.

Rheumatism caused 34 admissions, equal to a ratio of 20·9 per 1,000, which is lower than in the previous year and than the average rate by 14·5 and 34·6 respectively. The admission rate in the Barbados Command was 25·2 and in Jamaica 18·6 per 1,000. No case of rheumatic fever is returned, and there was no death.

Debility was the cause of 9 admissions or 5·5 per 1,000, as compared with 2·0 in 1896 and with 6·5, the average rate. The 10 admissions shown under the heading of *other general diseases* comprised 5 for non-malignant new growth, 3 for yaws, and 2 for anæmia.

LOCAL DISEASES.—*Diseases of the Nervous System* caused 20 admissions, or a ratio of 12·3 per 1,000, which is lower than the previous year's rate by 2·1, but above the average by 1·8. The admissions were 11 for epilepsy, 6 for neuralgia, and one each for neuritis, paralysis, and vertigo; 17 of the cases occurring in Jamaica, including all the admissions for epilepsy. One of the latter was a case of feigned disease, and since action was taken to prevent further malingering no fresh admissions occurred.

Diseases of the Eye.—There were 29 admissions, equal to a ratio of 17·8 per 1,000, which is lower than the previous year's and the average rate by 10·4 and 8·8 respectively. In Jamaica there were 20 cases and in Barbados 9; most of the admissions were for conjunctivitis.

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Diseases of other Organs of Special Sense caused 14 admissions, all but 2 being in Jamaica. The cases included 12 of inflammation of the external meatus and 1 of nasal affection.

Diseases of the Circulatory System caused 21 admissions, the ratio, 12·9 per 1,000, being below the previous year's and the average rate by 6·1 and 1·2 respectively. The cases included 10 of valvular disease and 9 of disordered action of the heart, 5 of the former and 6 of the latter being in Jamaica, and there was one admission each for pericarditis and varix. One death occurred from pericarditis in Jamaica. The cause of the cases of disordered action of the heart in Jamaica is considered to have been excessive cigarette smoking.

Diseases of the Respiratory System.—There were 57 admissions and 2 deaths. The admission rate, 25·0 per 1,000, is lower than that for 1896 by 22·0, and than the average rate for the preceding ten years by 14·3. 51 admissions occurred in Jamaica, 27 for bronchitis, 21 for pneumonia, 2 for spasmodic asthma, and 1 for pleurisy; at Barbados there were 2 and at St. Lucia 4 cases of bronchitis. Both deaths were due to pneumonia, and occurred in Jamaica.

Diseases of the Digestive System gave a ratio of 85·3 per 1,000, which is higher than that for the preceding year by 32·2 and than the decennial average rate by 20·8. There were 139 admissions, of which 84, or 78·2 per 1,000, occurred in Jamaica, and 55, or 99·1 per 1,000, in the Barbados Command. Among the former were 26 for diarrhœa, 22 for affections of the mouth and throat, 11 for hernia, 10 for dyspepsia, and 8 for colic, and among the latter 21 for mouth and throat affections, 17 for colic and 6 for diarrhœa. There was no death.

Dyspeptic troubles are noted as being probably due to excessive indulgence in mangoes or other indigestible articles of diet such as half-boiled yams, &c., and to the troops being provided with a diet to which they have not been accustomed in civil life. The Medical Officer in charge of the Station Hospital at Up Park Camp, Jamaica, reports on this latter point that, "though there are only 8 cases of colic recorded, a great many " young soldiers and recruits report sick with this disorder, and on careful " inquiry of these recruits, I have found that in many instances they have " never, before enlistment, been regularly accustomed to animal food, and " particularly beef. They imagine it is their duty as soldiers to consume " their pound of beef daily and at one meal."

Diseases of the Lymphatic System caused 44 admissions, equal to a ratio of 27·0 per 1,000, which is higher than that for 1896 by 5·4 but lower than the average rate by 16·8. There were 27 admissions in Jamaica and 17 in the Barbados Command. The cases included one of elephantiasis, in which the penis and scrotum were affected. The man was a native of Barbados, and had served in West Africa. For *diseases of the urinary system* there were 3 admissions in Jamaica, 2 being for nephritis and 1 for Bright's disease. *Diseases of the generative system* were the cause of 83 admissions of which 52 were for soft chancre, 10 for ulcer of penis, and 7 for stricture of urethra, the ratio, 51·0 per 1,000, being lower than that for 1896 and than the average rate by 19·2 and 68·0 respectively. For *diseases of the organs of locomotion* there were 19 admissions, of which 14 were in Jamaica. *Diseases of the connective tissue* caused 48 admissions, equal to a ratio of 29·5 per 1,000, which is higher than the previous year's rate by 13·1 but fractionally below the average rate. There were 41 admissions for *diseases of the skin*, the ratio, 25·2 per 1,000, being little more than half the average rate.

INJURIES.—There were 115 admissions and 2 deaths. The admission rate was 70·6 per 1,000, which is less than the previous year's rate by 4·8, and than the average rate by 7·7. The ratio in Jamaica was 62·4 and in the Barbados Command 86·5 per 1,000. There was one admission for multiple injury at Port Royal, the result of an explosion of gunpowder while a heavy gun

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82·9 per 1,000, in the Barbados Command. Including the si as killed
soft chancre, which caused 52 admissions, and the constant si
men, the admission ratio for primary venereal sores was
lower than the corresponding rate in 1896 and than the the result of a
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sick rate is higher by ·16. I heart, and bronchitis 3 each, and 2 cases
constantly sick rate 4·50 p wound.
previous year. In the P The average strength of women was 81, with 40
50·4 and the constantl 13 of remittent fever and 3 of ague), and the
4·53 per 1,000 respe children 73 with 65 cases of illness and 2 deaths.
Gonorrhœa cau remittent fever among the children. No death
sick with this women, those of the children being due to debility
sick rate 9·9 respectively.
previous y
in the In Barbados, of 8 cases of arm-to-arm vaccination in children
precedi Of 3 primary vaccinations with preserved lymph amongst
1·07 but 1 amongst the women and 3 amongst the children
119 failures. Of 103 re-vaccinations amongst the men with preserved
a successful. failures, and 1 amongst women was successful. There were
lymph 23 were failures amongst children. In Jamaica there 125 primary
re-vaccinations with preserved lymph amongst the men, with 26 failures, and
vaccinations amongst the children, both successful. Of 328 re-vaccinations amongst
the men 102 were failures.

RECRUITING.—Of 715 recruits medically inspected at Jamaica, 413 were rejected as unfit.

The chief causes of rejection were, under chest measurement (83), syphilis (62), hernia (29), loss or decay of many teeth (26), disease of heart (24), defective vision (19), flat feet (11), varicocele (11).

The average age, height, weight, and chest measurement of the 332 found fit were as follows:—

Age	20·4 years.
Height	68·2 inches.
Weight	137·5 lbs.
Chest measurement	34·3 inches.

and their state of education is shown as:

Well educated	4
Able to read and write	179
Able to read only	19
Unable to read	130

At Barbados 170 out of 317 inspected were rejected.

The chief causes of rejection were, under chest measurement (41), defective vision (14), disease of heart (13), hernia (9).

The average age, height, weight, and chest measurement of the 147 found fit were:—

Age	20·2 years.
Height	67·1 inches.
Weight	134·0 lbs.
Chest measurement	33·3 inches.

and their state of education is shown as:—

Well educated	1
Able to read and write	87
Able to read only	33
Unable to read	26

SANITARY CONDITIONS.

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he general health of Jamaica was unsatisfactory during 1897, rial fevers being prevalent in the island to a far greater vious years. The meteorological conditions are reported ar, the year being unprecedentedly dry from January to nuous torrential rains fell and continued throughout ber. During this period a considerable disturbance in Kingston in connection with the new drainage of the epidemic prevalence of disease, the European sent to Newcastle in October, and in the middle Camp Barracks were vacated and the troops placed savannah to the south.*

the general health of the troops was good, and, with the of some cases of dysentery during the autumnal rains and lmia amongst the children, none of the epidemic influences prevailing the island affected the station. Yellow fever occurred only amongst men who contracted the disease in the plains, and was confined entirely to these isolated cases. The influx of Europeans from Port Royal caused some over-crowding, and the Senior Medical Officer (Brigade-Surgeon-Lieut.-Col. E. H. Joynt, M.D.), strongly recommends that new buildings should be erected in the vicinity of Newcastle to accommodate 200 European troops from Port Royal during the prevalence of epidemics in the plains, and that married quarters should be provided at Newcastle for their families. For the temporary isolation of individuals arriving from an infected district, concrete platforms, on which bell tents and marquees are pitched, are in use. Amongst sanitary improvements during the year it is noted that the surface drainage has been perfected, a new hut for officers built, verandahs added to some of the married quarters, new guard room and ablution room constructed and a building, with means of heating, erected for storing dry earth for latrines. This last improvement has proved very beneficial during the rains. The bush in the vicinity is kept down by "bush-fatigue parties."

At *Up Park Camp* the sanitary conditions were unsatisfactory. To the north and east the district known as Swallowfields is covered with low bush and studded with poor cottages, destitute of any conservancy arrangements, the soil being polluted with refuse and rotting vegetation. The garrison cemetery, on the east, has become overcrowded, and further burials in it have now been prohibited. On the west and south-west there are ravines, which have for long been the receptacles of the drainage of the camp and houses in the vicinity. Steps are being taken to have this drainage connected with Kingston drainage system. The water supply for the greater part of the year was unfiltered Hope River water, which is said to flow through populous districts, and receives the surface drainage and washings of stables in Gordon Town. The drinking water is filtered through Pasteur-Chamberland filters in barracks, but these become clogged with mud during heavy rains, and during dry weather the pressure is stated to be insufficient to make them work properly. The water supply to the hospital is also noted as unsatisfactory, both as to quality and quantity; and the means of filtration insufficient. At the end of November, the unfiltered Hope River water was cut off, and a water supply was obtained from the municipal reservoirs, where it is filtered through sand, with resulting decrease in admissions for enteric fever and dysentery.

A shed was erected for the dry earth used in latrines, and latterly lime was mixed with the earth. With the exception of four blocks and some small buildings the barracks and hospital are of old construction. Much of the woodwork was found rotten, especially in E block, where the roof had been leaking. This block had to be vacated on account of the amount of sickness in it. The hospital had also to be vacated and the woodwork and flooring are to be renewed. Many of the barrack floors have

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* Early in January, 1898 the camp was removed to Shortwood, about 4 miles to the north-west and at an elevation of some 400 feet above sea level.

West Indies. been taken up and the basements and verandahs cemented. Similar improvements are required in the officers' quarters.

The wooden infectious hospital is reported to be unsuited for the purpose, and there is a strong recommendation that special wards should be constructed for serious cases, ophthalmic cases and officers. A barrack room for men of the Medical Staff Corps and quarters for warrant officer near the hospital are much desired. The steward's store is reported to be dark and badly ventilated and generally unsuitable.

At *Port Royal*, the barrack accommodation is reported to be insufficient for the number of troops in garrison. During the year, many of the barrack floors were renewed and pipes are being laid to bring the water supply direct to the barracks from Rocky Spring, instead of, as at present, by boats. The largest of the forts, Fort Clarence, was unoccupied, being under reconstruction. The chief sanitary defect is the native town, which is described as a permanent menace to the health of the garrison. The town is stated to abound in brothels and grog shops, the buildings are crumbling into ruins and the soil is impregnated with the filth of ages. There also seems to be an entire want of good conservancy arrangements.

BARBADOS.—The health of the troops was remarkably good but for venereal disease. There was no enteric fever, and the sanitary conditions generally were favourable, with the exception of a drain running parallel to the officers' mess, which was found blocked by roots of trees. A verandah was added to the married quarter at the station hospital, the hospital drains were cleansed, and the floor of the brick barracks' canteen relaid during the year.

ST. LUCIA.—Intemperance prevailed, a cheap rum being obtained in the town of Castries, often from unlicensed houses. "For a time during the year it was necessary to restrict the soldiers from frequenting the town, owing to the facilities there of obtaining liquor. This led to an improvement in the general health of the troops." The sanitary condition of the barracks is good. The surface drains at Vigne were completed during the year and extended to the sea, and baths were provided for the married quarters. The vicinity, however, is in an unsatisfactory condition, the native houses having no drainage or conservancy arrangements.

VIII.—ON THE HEALTH OF THE TROOPS SERVING IN WESTERN AFRICA.

SICKNESS AND MORTALITY.

I.—EUROPEAN TROOPS.

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The European troops consisted of the officers serving in the Command, the European non-commissioned officers of the West India Regiment, and the non-commissioned officers and men of the Royal Artillery and the Royal Engineers, who remained in the Command during the whole year.

The following table shows the admission, mortality and invaliding rates, &c., among the non-commissioned officers and men :—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
38	98	2	—	2	13	—	3·21	2578·9	52·63	342·11	—	84·47

In comparison with the previous year the admission, death and constantly sick rates have declined by 534·3, 3·97 and 7·42 respectively; the admission rate is lower by 73·8, and the constantly sick rate by ·42 than corresponding average ratios for the preceding eight years, but the death rate is higher by 7·61. The average sick time to each soldier was 30·83 days, which is shorter than in 1896 by 2·71 days but fractionally longer than the corresponding average period for the eight years 1889–96. The average duration of each case of sickness, 11·96 days, is longer than in the previous year by 1·19 days and than the average period by about a quarter of a day.

In Abstract No. VIII is a table showing the principal statistics of sickness and mortality arranged according to the various sections of disease. The disease furnishing the largest number of admissions was remittent fever, 69 cases being recorded with 2 deaths. The ratio of prevalence was 1815·8 per 1,000, as compared with 1943·4 in 1896. Including 3 cases of soft chancre there were 11 admissions for venereal diseases, and there were 3 admissions for orchitis, 2 for dyspepsia and 2 for rheumatism, other affections being only represented by single cases.

The number of men invalided to England was 13, equal to a ratio of 342·11 per 1,000, which is below the previous year's rate by 35·25, but above the octennial average rate by 104·17. The diseases for which the men were sent home were, remittent fever 10 cases, and secondary syphilis, soft chancre and orchitis, one case each. No man from the Command was discharged during the year as medically unfit.

The average strength of officers was 30, and there were 61 cases of sickness, including 33 of remittent fever, 5 of injuries, 4 of ague, 3 of neuralgia, and 2 each of diarrhœa and hepatitis. The ratio of admission for all diseases was 2033·3 and that for malarial fevers 1233·0 per 1,000, as compared with

West Africa. 2423·1 and 1615·4 respectively in 1896. One officer died and there were ten officers invalided home, remittent fever being the cause in each instance.

There were only 2 women and 4 children belonging to European troops in the Command during the year ; among them no sickness is recorded.

II.—NON-EUROPEAN TROOPS.

The average strength of non-commissioned officers and men was 822, of whom 720 were stationed at Sierra Leone, and 102 at Cape Coast Castle. The non-European troops serving on the West Coast throughout the year consisted of the Sierra Leone Company, Royal Artillery, the 2nd Battalion West India Regiment, and a detachment of the West India Fortress Company, Royal Engineers. The 1st Battalion West India Regiment, joined from the West Indies in December.

The admission, mortality and invaliding rates, &c., are given in the following table :—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent to West Indies.	Finally Discharged.		Admissions.	Death.	Invalids sent to West Indies.	Invalids finally Discharged.	Constantly Sick.
822	1173	13	3	16	91	29	60·70	1427·0	19·46	110·71	35·28	73·84

In comparison with the previous year the admission and constantly sick rates have decreased by 652·5 and 26·85, and with the average rates for the preceding ten years by 470·1 and 13·94 respectively, the death rate being higher than in 1896 by 3·98, but ·75 below the average. The average sick time to each soldier was 26·95 days, which is shorter than in the previous year by 9·90 and than the decennial average period by 5·09 days. The average duration of each case of sickness was 18·89 days, being longer than in 1896 by 1·17, and than the average period for the ten years 1887–96 by 2·00 days.

The principal statistics of sickness and mortality arranged according to the various sections of disease are shown in Abstract IX.

GENERAL DISEASES.—*Eruptive fevers* were represented by 5 cases of chicken-pox and 2 of cow-pox. For *dysentery* there were 9 admissions and 1 death, the ratio of prevalence being 11·0 per 1,000, which is higher than that for the previous year by 4·8 but lower than the average rate for the preceding ten years by 3·4.

Malarial Fevers caused 575 admissions, or a ratio of 699·5 per 1,000, which is lower than the previous year's rate by 627·7 and than the decennial average rate by 272·6. The average number constantly sick from these fevers was equal to a ratio of 20·43 per 1,000, as compared with 33·67 in 1896 and 26·92, the average rate for the preceding ten years. There was no death from these fevers during the year, and of the admissions 574 are returned as remittent fever and 1 as ague. It is stated that the weeding out of cases of chronic malarial poisoning by invaliding accounts for the great diminution in the sickness returned under this heading.

Septic Diseases.—A single case of erysipelas is recorded.

Tubercular Diseases.—There were 9 admissions and 8 deaths, the latter including that of an invalid. The admission ratio, 11·0 per 1,000, is lower than that for 1896 by 4·5, and than the average rate for the preceding ten years by 2·2, the mortality rate, 9·73 per 1,000, being higher by 4·57 in the former comparison and by 5·10 in the latter. Of the cases 8, with 7 deaths, were due to tubercle of lung.

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Venereal Diseases.—Primary syphilis caused 22 admissions, or a ratio of 26·8 per 1,000, which is lower than that for the previous year by 49·6. If to this be added the sickness from soft chancre, for which there were 57 admissions with 3·49 men constantly sick, the total admission ratio for primary venereal sores equalled 96·1 per 1,000, as compared with 137·2 in the previous year and 107·0, the average rate. *Secondary syphilis* with 55 admissions, gave a ratio of 66·9 per 1,000, which is higher than in 1896 by 15·3 and than the decennial average rate by 15·4. *Gonorrhœa* was the cause of 77 admissions, the ratio, 93·7 per 1,000, being below the previous year's rate by 1·2 and the average by 29·6. Including all forms, the total admission ratio for venereal diseases was 256·7 per 1,000, which is lower than the corresponding rate in the previous year by 27·0, and than the average rate for the preceding ten years by 25·1. The total amount of constant inefficiency on account of these diseases was equal to 24·03 per 1,000, which is higher than the corresponding rate in 1898 by ·16 and than the average rate by 2·11. "Readmissions," it is noted, "enter largely into the above statistics." In certain cases "no desire to effect a permanent cure, or to avoid a relapse, is evinced."

Parasitic Diseases were the cause of 19 admissions, comprising 16 for ringworm and 3 for scabies, the ratio, 23·1 per 1,000, being below the average rate by 25·8.

Rheumatism caused 62 admissions or a ratio of 75·4 per 1,000, which is higher than that for the preceding year by 14·5, but lower than the decennial average rate by 6·6. No case of rheumatic fever is recorded.

For *debility* 2 admissions are shown, and *other general diseases* were represented by 4 cases of non-malignant new growth.

LOCAL DISEASES.—For *diseases of the nervous system* there were 2 admissions, viz.: 1 each for neuralgia and mania, the ratio, 2·4 per 1,000, being below the previous year's rate by 3·8 and the average by 10·0.

Diseases of the Eye.—There were 18 admissions, equal to a ratio of 21·9 per 1,000, which exceeds that for 1896 and the decennial average rate by 10·6 and 2·3 respectively. Thirteen of the admissions were for conjunctivitis.

Diseases of other Organs of Special Sense were represented by 2 cases of aural disease and by 1 admission for nasal affection.

Diseases of the Circulatory System.—The admissions under this heading were 8 in number, and there were 2 deaths, one being that of an invalid who had been sent to the West Indies. The admission ratio, 9·7 per 1,000, is below the previous year's rate by 10·9 and the average rate by 4·8. The cases included 4 of disordered action and 2 of valvular disease of the heart, 1 of aneurysm, and 1 of varix. The death in the Command was due to aneurysm and that of the invalid to valvular disease of heart.

Diseases of the Respiratory System.—Thirty-eight admissions are recorded, the ratio, 46·2 per 1,000, being above that for 1896 by 11·1 but below the average rate for the ten years 1887–96 by 6·6. Bronchitis accounted for 26 of the admissions, and there were 5 cases of spasmodic asthma, 3 each of pneumonia and pleurisy, and 1 of empyema. Four deaths occurred, 2 from pneumonia and 1 each from empyema and pleurisy, the latter being that of an invalid sent to Jamaica.

Diseases of the Digestive System.—There were 34 admissions, equal to a ratio of 41·4 per 1,000, which is lower than the previous year's rate by 17·4, and than the average rate by 25·1. Among the cases treated were 12 of diarrhœa, 4 of colic, and 4 of throat affections.

Diseases of the Lymphatic System caused 22 admissions, the ratio, 26·8 per 1,000, being below the previous year's and average rates by 4·2 and 15·1 respectively.

Diseases of the Urinary System were represented by a single (fatal) case of Bright's disease.

Diseases of the Generative System caused an admission rate of 79·1 per 1,000, which is above that for the previous year by 6·9, but below the average rate by 5·3. There were 6 admissions for orchitis and 2 for hydrocele. The remaining admissions were 57 cases of soft chancre, which have been already referred to under the heading of venereal diseases

Diseases of the Organs of Locomotion, with 12 admissions, gave a ratio of

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West Africa. 14·6 per 1,000, which is lower than in 1896 by ·9, but higher than the decennial average rate by 2·8

Diseases of the Connective Tissue, with a ratio of 31·6 per 1,000, show a decline of 1·4 and 6·6 respectively in the two comparisons. Nineteen of the admissions were for abscess and 7 for inflammation.

Diseases of the Skin were the cause of 44 admissions, equal to a ratio of 53·5 per 1,000, which is below the average rate by 36·7. As usual, ulcers, eczema and boils were the most frequent causes of admission.

INJURIES.—There were 58 cases of local injury, the equivalent ratio being 70·6 per 1,000, which exceeds the previous year's rate by 22·1 and the average rate by 1·5. The principal causes of admission were wounds, contusions, abrasions and blisters of feet.

INVALIDING.—The number of men sent to the West Indies was 91, equal to a ratio of 110·71, which is higher than that for 1896 by 100·39 and than the average rate for the preceding ten years by 73·32. It is remarked that the number of men sent from the Command in any one year depends upon the transport arrangements, and comparisons of one year with another are consequently fallacious. The principal causes of invaliding to the West Indies were secondary syphilis 21 cases, remittent fever 12, tubercle of lung 12, rheumatism 8, valvular disease of heart 6, and debility and disordered action of heart 5 cases each. The number of men finally discharged the service by invaliding was 29, including 3 who were discharged at Sierra Leone. The ratio, 35·28 per 1,000, is higher than in the previous year by 7·42, and than the average rate by 19·56. The principal diseases necessitating discharge were secondary syphilis 6 cases, tubercle of lung 5, valvular disease of heart 4, and caries of spine 2 cases.

WOMEN AND CHILDREN.—In an average strength of 37 women there were 89 cases of sickness, or a ratio of 2405·4 per 1,000, which is higher than that for 1896 by 72·1. Among the cases were 22 of remittent fever, 13 of dyspepsia, and 6 of bronchitis. The average strength of children was 33, and 48 cases of illness are recorded, equal to a ratio of 1454·5 per 1,000, which is below the previous year's rate by 795·5. There were 18 cases of remittent fever, and 7 of bronchitis. No death occurred among the women and children.

VACCINATION.—All vaccinations were from preserved lymph from Aldershot. Of 12 primary vaccinations amongst soldiers and 5 amongst children, the whole of the former and 2 of the latter were failures. Of 201 re-vaccinations amongst soldiers 154 were failures, and of 7 amongst children only 2 were successful.

SANITARY CONDITIONS.

The Senior Medical Officer (Surgeon-Major J. Hickman, A.M.S.) reports that no special sanitary improvements have been effected during the year at Sierra Leone. The barracks are considered in every respect satisfactory, and there is a good and abundant supply of water. A recreation room, however, is noted as being much needed for the European gunners stationed in King Town. A new mortuary, kitchen, and ward annexes are required at the Tower Hill Hospital, and additional latrine accommodation at Mount Auriol Hospital. Small pox is noted as being endemic in Sierra Leone, but vaccination and re-vaccination have conferred immunity on the troops and their families stationed there.

The medical officer in charge at Cape Coast Castle (Surgeon-Captain J. Ritchie, A.M.S.) notes that "the town is very insanitary still, though there have been many improvements recently. When the troops arrived the arrangements for removing excreta were far short of the requirements of the population, and thus excrement could be seen in all the streets, while in the outskirts of the town every highway, bypath and open space was used as a latrine. "Since then, however, several additional latrines have been erected and defecation in public has, to a great extent, been stopped.

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These latrines are emptied into the sea, and into shallow water within low water mark. The town is also overcrowded, and the manufacture of dried fish, which goes on in all the houses, fills the place with offensive odours. The water supply is partly by rainwater and partly by shallow wells, the latter being dangerous."

The troops are quartered in the Castle, and from May till September there was considerable overcrowding. The drinking water for the troops is rain water collected on the roof and stored in large tanks within the castle. The water used daily is boiled for 20 minutes and kept in covered barrels. There is great scarcity of water for ablution, three gallons per head daily being the allowance. The supply is from wells, about ½ mile distant, and the character of the water is suspicious. The ablution arrangements are also defective, and sea-bathing has to be prohibited on account of the foulness of the sea in the vicinity of the castle. The means of varying the cooking are also defective. The chief defect, however, in the opinion of the medical officer in charge, is the latrine arrangements. "There are no urinals. There are three latrines, one for officers, and two for men. In the officers' latrine, the dry-earth system prevails, sand mixed with charcoal being used as deodorizer. Instead of the excrement being then, however, carried from the Castle, it is emptied into the sea close to the Castle with the men's sewage. The remaining two latrines are small buildings, one overhanging a rock, only covered by the sea in very high tides, and the other overhanging a shallow bay. No receptacle is provided for excrement, which drops either on the bare rock or into shallow water, where it is carried on to the rocks by the tide or pollutes the bay, which is very small."

The hospital is non-dieted, and consists of three rooms in the Dalziel Tower Upper Story. It is considered satisfactory, but has no separate latrines or urinals.

IX.—ON THE HEALTH OF THE TROOPS SERVING IN SOUTH AFRICA AND AT ST. HELENA.

SICKNESS AND MORTALITY.

I.—EUROPEAN TROOPS.

outh Africa and t. Helena.

The average strength of the warrant officers, non-commissioned officers and men serving in the Command during the year was 7,205, of which number 212 were stationed at St. Helena.

The troops stationed in South Africa throughout the whole year were the 7th Hussars; 9th Lancers; 10th Mountain Battery and the District Establishment, Royal Artillery; No. 29 Company Royal Engineers; the 1st Battalions of the Leicestershire and Middlesex Regiments, and the 1st and 2nd Battalions, King's Royal Rifle Corps; and detachments of Army Service Corps, Medical Staff Corps, Army Ordnance Corps, and Garrison Staff.

The arrivals during the year consisted of the 1st Battalion Royal Irish Rifles from England in May; the 2nd Battalion Royal Dublin Fusiliers from India and the 13th, 67th, and 69th Field Batteries, Royal Artillery, from England, in June; and the 14th and 23rd Companies, Western Division, Royal Artillery and the 1st Battalion Liverpool Regiment from the West Indies in December.

The 2nd Battalion York and Lancaster Regiment left the Command for India early in January; the Mounted Infantry Battalion for England in May; and the 25th and 26th Companies Western Division, Royal Artillery, for India and Mauritius respectively, and the 2nd Battalion West Riding Regiment for India, in December.

Three additional stations were occupied in May, viz.:—Grahamstown, King William's Town, and Ladysmith.

The European troops in the garrison at St. Helena consisted of the St. Helena Detachment, Royal Artillery, and a company of the 1st Battalion Leicestershire Regiment, the latter being relieved in December by the headquarters and two companies of the 3rd Battalion West India Regiment.

The subjoined table shows the admission, mortality, and invaliding rates, etc., relating to the troops in South Africa and in St. Helena, and also those for the whole Command.

1897.	Average Strength.	Admissions.	Deaths.			Invalids.	
			In the Command.	Of Invalids.	Total.	Sent Home.	Finally discharged.
South Africa ..	6,993	6,116	47	2	49	74	65
St. Helena ..	212	182	1	—	1	1	1
Total ..	7,205	6,298	48	2	50	75	66

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(continued)

1897.	Average constantly Sick.	Ratio per 1,000 of Strength.				
		Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.
South Africa ..	404·49	874·6	7·01	10·58	9·29	57·84
St. Helena ..	7·48	858·5	4·72	4·72	4·72	35·28
Total ..	411·97	874·1	6·94	10·41	9·16	57·18

Comparing the ratios for the whole Command with those for the previous year and with the average ratios for the preceding ten years, the admission rate is higher by 10·6 and 5·8, the mortality rate by 2·18 and ·31, and the constantly sick rate by 2·76 and 1·33 respectively. The average sick time to each soldier was 20·87 days and the average duration of each case of sickness 23·88 days, each being longer than in 1896 by almost a day, and than the decennial average period by about half a day.

For South Africa alone the admission rate was lower than in the previous year by 2·3, but the death rate was higher by 1·99 and the constantly sick rate by 2·29. At St. Helena the admission, mortality, and constantly sick rates were all higher than in 1896, by 236·8, 4·72, and 1·32 respectively.

In Abstract XXVI is a table showing the health statistics for the several regiments and corps which served in the Command during the year. Omitting those whose average annual strength was less than 100 men, the highest admission ratios were all furnished by corps stationed at Pietermaritzburg, viz.:—1369·1 per 1,000 in the 2nd Battalion Royal Dublin Fusiliers after arrival from India in June; 1213·8 in the Mounted Infantry, which left for England in May; 993·6 in the 10th Mountain Battery, Royal Artillery, at the station during the whole year, and 981·8 in the 2nd Battalion West Riding Regiment, which left for India in December. The lowest ratio of admission was 474·6 per 1,000 in the Medical Staff Corps, the next lowest being 685·1 in the 2nd Battalion King's Royal Rifle Corps at Cape Town and Wynberg. The highest mortality ratio was 19·35 per 1,000 in the 10th Mountain Battery, which also gave the highest death rate in 1896. The Medical Staff Corps shows the next highest mortality, viz., 16·95 per 1,000.

In other units of the R.A. there was no mortality, and the next lowest ratios were 4·09 per 1,000 in the 2nd Battalion King's Royal Rifle Corps and 4·18 per 1,000 in the 1st Battalion Leicestershire Regiment. The ratio of constant inefficiency was highest, 86·13 per 1,000, in the 10th Mountain Battery at Pietermaritzburg and lowest, 39·18, in the 1st Battalion Royal Irish Rifles, at Ladysmith.

With regard to the influence of age on the sickness and mortality among the troops, the admission ratio was 872·9 per 1,000 among men under 20 years of age, increasing to 1028·6 among those between 20 and 25, then falling to 728·6 among men between 25 and 30 years, to 563·7 among men between 30 and 35, and to 329·9 among men of more than 35 years of age. In 1896 the highest ratio was that of men under 20 years of age, but in other respects the results were similar. There was no mortality among men under 20 years of age, but 18 deaths, or 4·80 per 1,000, occurred among those between 20 and 25; 22 deaths, or 9·30 per 1,000, among men between 25 and 30; 6, or 14·71 per 1,000, among men between 30 and 35; and 2 deaths, or 10·15 per 1,000, in men of more than 35 years of age. In the preceding year mortality was also highest among men between 30 and 35, and there was no death among men under 20 years of age.

With reference to service in the Command, the highest admission ratio was 962·1 per 1,000, among men in their second year, that of men in their first year, 895·2 per 1,000, coming next, followed by 744·2 among men in

South Africa and St. Helena.

their fourth year, 712·4 among those in their third year, and 430·5 among men who had been more than four years in the Command. In 1896 the highest and next highest ratios were also among men in their second and first years respectively, and the lowest amongst men of longest service in the Command. There were 23 deaths, or 5·58 per 1,000, among men in their first year; 15, or 8·11, among those in their second year; 4, or 6·46, among those in their third; 4, or 10·23, among men in their fourth; and 2, or 8·97 per 1,000, among men who had been more than four years in the Command.

The principal statistics of sickness and mortality arranged according to the different sections of disease are given in Abstract X.

GENERAL DISEASES.—*Eruptive fevers* were represented by 5 cases of measles and 1 of rubella, and there were 13 admissions for *influenza.*

Enteric fever caused 160 admissions and 13 deaths; equal to ratios of 22·2 and 1·80 per 1,000 respectively, the former being higher than the previous year's rate and the average for the preceding ten years by 12·0 and 12·6 respectively, while the latter is lower than in 1896 by ·47 but higher than the average by ·05. The percentage of mortality to attacks was 8·1, as compared with 22·2 in 1896, and 18·2, the average of the previous ten years. The admissions and deaths were distributed as follows:—115 cases with 6 deaths, at Pietermaritzburg; 17 cases, with 1 death, at Ladysmith; 9 cases, with 2 deaths, at Cape Town; 9 cases with 1 death, in Rhodesia; 7 cases, with 3 deaths, at King William's Town, and 3 non-fatal cases at Wynberg.

In none of the Stations has a definite cause been ascertained. At Cape Town, King William's Town, and Pietermaritzburg enteric fever is noted as being prevalent generally among the civil population; while at Ladysmith the disease is attributed to pollution of the Klip River, from which the water supply is derived. At King William's Town suspicion was attached to the close proximity to the camp of the carts used for removing the night soil from the town; and it is noted that since their removal to a distance no fresh cases occurred. The Rhodesia cases occurred while the troops were in camp at Buluwayo, and nothing has been noted there to account for their origin.

The following notes on the epidemic at Pietermaritzburg are submitted by Surgeon-Major R. J. S. Simpson, who was in medical charge of the station at the time:

"As usual the year is divided by a minimum period occurring about June,
"that is, in the middle of the cold season, but this year there were an
"unusual number of cases in May."

'Dealing with the earlier portion of the year:

"Of the 31 admissions up to the end of May seventeen were men of the 9th
" Lancers who arrived in Natal from England in September, 1896. Shortly
' after their arrival the regiment was divided into two sections, one of which
"was quartered in the Agricultural Show Grounds on the outskirts of the
"town, while the other occupied the Cavalry barracks in Fort Napier,
"details as follows:—

"Strength at Fort Napier, 355. Cases 8
" " " Show Ground 190. " 9

"giving a percentage of admissions to strength of 2·25 and 4·73 respectively.
"Though the numbers are too small to lead to any very decided conclusion
"as to the influence of the locality, they would seem to indicate some
"additional unfavourable condition at the Show Ground.

"The Mountain Battery had a large number of cases in proportion to
"its strength but no special condition can be detected as acting unfavour-
"ably on this unit. The disease was much more prevalent during the latter
"half of the year, the greatest number of admissions occurring in October,
"which is again opposed to its usual mode of occurrence.

"Of 84 admissions between July and December, 38 were men of the 2nd
"Battalion Royal Dublin Fusiliers, who arrived from India in June and
"were quartered under canvas in Fort Napier. Of the remaining 46, 15
"occurred amongst the men of the 2nd Battalion West Riding Regiment
"prior to their departure for India in December; 14 cases occurred in the

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"7th Hussars after the return of the main body of the regiment from "Rhodesia, whilst 6 were amongst men of the Mountain Battery."

"As usual the percentage of the admissions for the groups 20–25 is greater "than the succeeding group, but the difference this year is less than the "average, and calculating the number of admissions of these men relatively "to the number of men in the other age group it is found that an average "annual strength of 1,253 men of from 20–25 years of age gave 64 "admissions, while an average annual strength of 794 men between 25 and "30 years of age gave 46 admissions, or an admission rate per hundred "men of 5·10 and 5·79 respectively, so that the actual incidence in the older "group is heavier instead of lighter.

"Seventy-four per cent. of the admissions had less than one year's service; "51 per cent. less than six months' service in the command."

"There is much difficulty in determining the origin of these cases."

The water supply was, of course, under suspicion. The water itself is an upland water of fair average quality, as shown by the chemical and bacteriological examinations made by Surgeon-Major D. Bruce, A.M.S.

A careful examination has been made of the waterworks, of the streams supplying them, and of the whole collecting ground, and while no individual instance of specific contamination has been detected, there is no doubt that contamination of the supply immediately above the intake must occasionally occur. The system of distribution in use in Fort Napier during the greater part of the year left every possibility of contamination. A new system obviating this is at present under construction.

Practically nothing but condensed milk has been used in camp. The 2nd West Riding Regiment up to September last used a small quantity of fresh milk in the canteen, but its use was discontinued after that date. It was of good quality.

Only such vegetables as require cooking are used in camp.

Enteric fever has been prevalent in the town of Pietermaritzburg during the year, and as no notification of diseases is carried out it is impossible to obtain any accurate information as to its occurrence and distribution, but there is little doubt that enteric fever is always present in Pietermaritzburg; further a marked increase in the number of cases coincided with the period of greatest prevalence amongst the troops.

The sanitary condition of the town is bad, there are no sewers, but only surface drains, and although the "pail" system is in use for the removal of night soil, there is no doubt that a certain amount of excreta, in addition to slop water, finds its way into the surface drains, which are only flushed by storm water, so that in dry weather they become extremely offensive in places. Further the men in the employment of the sanitary contractor have been detected in the act of emptying the pails in the gardens of houses in the town. The state of the vicinity of the public houses is, as a rule, unsatisfactory. These conditions obtain in all parts of Pietermaritzburg, so that there does not appear to be any benefit in putting any one part out of bounds.

For *other continued fevers* there were 334 admissions, of which 1 was for Mediterranean and the remainder for simple continued fever. The ratio was 46·4 per 1,000, which is higher than in 1896 and than the average rate by 11·7 and 10·1 respectively.

Dysentery caused 209 admissions, of which 118 occurred at Pietermaritzburg and 70 at Ladysmith, and there were 4 deaths from the disease. The ratio of prevalence was 29·0 per 1,000, which is above the previous year's rate by 15·6 and the average rate for ten years by 21·8. The mortality rate, ·55 per 1,000, exceeds that for 1896 by ·32 and the average rate by ·40.

At Pietermaritzburg the cases were as a rule mild in character, and were most prevalent in the months of August, October, November and December, and in many cases the attacks were attributed to chill.

Malarial Fevers.—There were 392 admissions and 1 death. The admission ratio was 54·4 per 1,000, which is above the previous year's rate and the average rate for the preceding ten years by 45·6 and 31·6 respectively. The increase is stated to be due to the prevalence of these fevers amongst the Mounted Infantry Battalion after service in Rhodesia, and amongst men of the Royal Dublin Fusiliers who had arrived from India. 318 cases were *outh Africa and t. Helena.*

admitted at Pietermaritzburg and 35 in Rhodesia, and of the total, 197 are returned as ague and 195 as remittent fever, the single death recorded being due to the latter disease. 180 of the cases of remittent fever occurred at Pietermaritzburg and were chiefly amongst men who returned from Mashonaland *viâ* Beira.

For *septic diseases* there were 9 admissions and 4 deaths, including 6 cases of erysipelas, with one death, and 3 fatal cases of pyæmia; two of the latter and the fatal case of erysipelas occurred at Pietermaritzburg.

One of the cases of pyæmia was due to a dog bite which had been neglected previous to admission to hospital. The finger was amputated, but the case proved fatal.

Tubercular Diseases caused 15 admissions and 6 deaths, 2 of the latter being in invalids who had left the Command. The admission ratio was 2·1 per 1,000, which is less than the previous year's rate by ·4 and than the average by 1·3. Of the cases 11, with 4 of the deaths, were due to tubercle of lung.

Venereal Diseases.—For *primary syphilis* there were 428 admissions, viz., 283 in Cape Colony, 139 in Natal and 6 at Helena, the ratio being 59·4 per 1,000, as compared with 68·9 in 1896. If to this be added the sickness from soft chancre, for which there were 49 admissions and 3·06 men constantly sick, the admission ratio for primary venereal sores was 66·2 per 1,000, which is lower than the previous year's rate by 7·7, and than the average rate for ten years by 36·6. *Secondary syphilis* with 289 admissions, of which 147 were in Cape Colony, 121 in Natal, 7 in Eshowe, 5 in Rhodesia, and 10 at St. Helena, gave a ratio of 40·1 per 1,000, which is higher than the previous year's rate by 7·2, but lower than the decennial average rate by 13·4 *Gonorrhœa* gave 679 admissions, comprising 374 in Cape Colony, 222 in Natal, 7 at Eshowe, 13 in Rhodesia, and 63 in St. Helena, or a ratio of 94·2 per 1,000, which is lower than in 1896 and than the average rate by 15·9 and 11·6 respectively. Taking all these forms of venereal disease together the total admission rate was 200·5 per 1,000, as compared with 216·9 in the previous year, and with 262·1, the average ratio for the ten years 1887–96. The total ratio of constant inefficiency on account of these diseases was 19·18 per 1,000, a ratio lower than that for 1896 by 1·90 and than the average rate by 2·59.*

From the above statement it will be observed that the decline noted in the report for the previous year continued during 1897. But the decrease is due to a marked decline in the venereal diseases of Cape Colony alone. In Natal, which was less affected than Cape Colony in 1896, there has been an increase. Thus the ratio of admissions for all venereal diseases in 1896 was 279·9 in Cape Colony and 148·7 in Natal, as compared with 246·1 and 150·8 respectively in 1897. The decline in Cape Town is specially satisfactory when taken in conjunction with the statement that there was a large influx of foreign prostitutes into the town during the year owing to the strict enforcement of laws against them in the Transvaal Republic.

For *parasitic diseases* there were 97 admissions, including 57 for scabies, 14 for ringworm, and 12 for tænia solium, the equivalent ratio being 13·5 per 1,000, which is above the decennial average rate by 1·9. There were 3 cases of *alcoholism.*

Rheumatism was the cause of 255 admissions, including 11 for rheumatic fever, and there was one death from the latter. The admission ratio, 35·4 per 1,000, is below the previous year's and the decennial average rates by ·6 and 4·4 respectively.

Debility caused 30 admissions, or a ratio of 4·2 per 1,000, which is less than that for 1896 by 1·0, and than the average rate by 6·8.

Under the heading of *other general diseases* there were 36 cases of non-malignant new growth, 23 of mumps, 8 of anæmia, and 5 of cyst.

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* There were 67 admissions for ulcer of penis of non-venereal origin, with 6·78 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 209·8. and 20·13 respectively.

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LOCAL DISEASES.—*Diseases of the Nervous System* caused 39 admissions and 1 death. The ratio of admission was 5·5 per 1,000, as compared with 8·6 in the previous year and 9·4, the average for the preceding ten years. Among the cases treated were 19 of neuralgia, 7 of epilepsy, 4 of mental disorder, and 3 of paralysis. The death was due to meningitis.

Diseases of the Eye.—There were 80 admissions, equal to a ratio of 11·1 per 1,000, which is fractionally lower than that for 1896 and 3·3 below the average rate. Of 55 cases of conjunctivitis, 21 occurred at Ladysmith, 14 at Pietermaritzburg and 10 at Wynberg. The cases at Ladysmith are attributed to the glare and to the clouds of dust which blow through the camp.

Diseases of other Organs of Special Sense caused 73 admissions, of which 67 were for aural affections, principally inflammation of the external meatus. The ratio, 10·1 per 1,000, differs but little from that for the previous year, but is 1·1 above the average rate.

Diseases of the Circulatory System were the cause of 45 admissions, or a ratio of 6·3 per 1,000, which is higher than that for 1896 by ·6 but lower than the decennial average rate by 3·9. The principal causes of admission were disordered action of the heart 22 cases, valvular disease 13, and varix 5. There was one death from hydropericardium.

Diseases of the Respiratory System accounted for 168 admissions, the ratio, 23·3 per 1,000, being lower than in the previous year by 2·3 and than the average rate by 4·9. Among the cases treated were 135 of bronchitic affections, 17 of pneumonia, and 11 of pleurisy. One death occurred from hæmoptysis.

Diseases of the Digestive System caused 774 admissions and 4 deaths. The admission ratio, 107·4 per 1,000, is lower than that for 1896 by 26·6, but higher than the average rate for the ten years 1887–96 by 2·8. Under this heading are included 351 admissions for various forms of throat affection, 156 for diarrhœa, 76 for dyspepsia, 60 for colic, 36 for hepatic disorders, 30 for affections of the mouth, and 21 for hernia. There were 2 deaths from abscess of the liver and 1 each from hepatitis and inflammation of stomach.

Diseases of the Lymphatic System.—There were 132 admissions, or a ratio of 18·3 per 1,000, as compared with 21·8 in 1896 and with 29·2, the average rate. All but 9 of the admissions were for inflammation of the lymphatic glands.

Diseases of the Urinary System, with 11 admissions, gave a ratio of 1·5 per 1,000, which differs only fractionally from the previous year's rate but is below the decennial average ratio by 1·4. The cases included 4 of incontinence of urine, 2 (one fatal) of Bright's disease, 2 of hæmaturia, and 1 each of pyelitis, cystitis, and retention of urine.

Diseases of the Generative System were the cause of 219 admissions, the ratio, 30·4 per 1,000, being above that for 1896 by 11·1 but below the average rate for the preceding ten years by 10·3. In addition to 49 cases of soft chancre referred to under the heading of venereal diseases, there were 67 cases of ulcer of penis, 47 of orchitis, 32 of balanitis, 6 of hydrocele, 4 of stricture of urethra, 4 of phimosis, and 3 each of urethritis, paraphimosis and varicocele.

Diseases of the Organs of Locomotion accounted for 105 admissions, equal to a ratio of 14·6 per 1,000, which exceeds the previous year's rate by 1·5 and the average rate by 4·6. Among the cases were 61 of synovitis, 17 of myalgia, and 9 of flat feet.

Under the heading of *diseases of the connective tissue* 229 admissions are recorded, the ratio being 31·8 per 1,000, which is lower than that of the previous year by 7·4, but higher than the average by 1·7.

Diseases of the Skin caused 319 admissions, including 118 for boils, 67 for eczema, 55 for ulcers, and 39 for whitlows. The ratio was 44·3 per 1,000, which is 9·4 below the average rate for the ten years 1887–96.

INJURIES.—The total admission ratio for injuries was 151·8 per 1,000, as compared with 159·3 in 1896 and with 120·6, the decennial average rate. There were 11 cases of *general injury*, viz., 5 of heat stroke, 1 of sun-stroke, 3 of multiple injury, and 2 of lightning stroke. The case of sun-stroke occurred at Wynberg on the return march from Cape Town, after the Queen's *outh Africa and t. Helena.*

birthday parade, on an excessively hot day. The cases of lightning stroke occurred at Eshowe. Two men were attempting to replace some iron spouting that had been broken by heavy rain, when both men were struck by the same flash of lightning, one being rendered unconscious and badly burned. The injuries sustained by the other were trivial. There were two deaths, both out of hospital, one being caused by a fall from a cliff at St. Helena, and the other by suffocation from submersion at Ladysmith. For *local injuries* 1,078 admissions are returned, among them being 317 for wounds, 283 for contusions, 237 for sprains and strains, 100 for blisters of feet, and 50 for fractures. Of 6 deaths, 2 were cases of suicide by gun-shot wounds, 3 were due to fractures of skull, two of which were caused by falls from horses and the third by a bicycle accident, and 1 was due to fracture of spine, caused during the act of diving into the river Klip at Ladysmith. In addition, there were 5 cases of gun-shot wounds received in action by men of the 7th Hussars during operations in Mashonaland. Two of these were almost immediately fatal. Of the other three, one patient had to have his leg amputated primarily at the knee joint and subsequently at the middle third of the thigh and was sent to the Civil Hospital at Fort Salisbury. He recovered sufficiently to be transferred to Pietermaritzburg. Another of the cases was a wound of the chest, shattering the eighth rib, which was removed the man being subsequently invalided. The third case was a slight wound of the hand. At Wynberg an increase in sickness is attributed to the number of slight injuries incidental to Mounted Infantry duties.

POISONS.—There were 3 admissions under this heading. In one case the man ate an electuary containing 60 grains of extract of belladonna which had been prepared for a sick horse, in the belief that it was a mixture of ordinary sweetstuff, and, although every remedial measure was attempted when he came for treatment an hour and a half afterwards, he died. In another case the man attempted suicide by drinking paraffin but recovered. The third admission was for a snake bite at Wynberg, which is stated to have been severe, although recovery was rapid. There was a death out of hospital from alcoholic poisoning which occurred while the man was in the custody of the civil police at Pietermaritzburg.

INVALIDING.—The number of men sent home during the year was 75, equal to a ratio of 10·41 per 1,000 which is lower than that for 1896 by 4·09, and than the average rate for the preceding ten years by 13·56. In addition to the men sent home, two men were discharged in the Command, and they are included in estimating the following invaliding ratios. Invaliding was at the rate of 10·95 per 1,000 in the Cavalry, 10·03 in the Artillery, *nil* in the Engineers, 10·29 in the Infantry, and 24·29 in other branches of the service, the corresponding ratios for 1896 being, 10·75, 23·47, 21·28, 14·16, and 5·24 respectively. Of the men invalided 6, or 12·29 per 1,000, were under 20 years of age; 46, or 12·28 per 1,000, were between 20 and 25; 19, or 8·03, were between 25 and 30; 3, or 7·35 per 1,000, were between 30 and 35, and 3 men, or 15·23 per 1,000, were over 35 years of age. In the previous year the highest invaliding rate was that of men between 20 and 25, and the lowest among those over 35 years of age. As to the influence of service in the Command on the invaliding, 26 men, or 6·31, per 1,000, were in their first year, 34, or 18·39, were in their second year, 8, or 12·92, were in their third, 4, or 10·23, in their fourth year, and 5 men, or 22·42 per 1,000, had been more than four years in the Command. In 1896 the highest rate was among men in their second year, and there was no invaliding amongst those in their fourth year of residence. The principal causes of invaliding to England were, diseases of the nervous system 14 cases (including 2 of mental disorders), or 1·94 per 1,000; diseases of the circulatory system 10 cases (including 1 case of disordered action of heart), or 1·39 per 1,000; tubercular diseases, secondary syphilis, and injuries received in action, each 7 cases, or ·97 per 1,000, and aural affections 5 cases, or ·69 per 1,000.

There were 66 men from the Command discharged during the year as medically unfit for further service, including the two men discharged locally, the equivalent ratio being 9·16 per 1,000, which is less than that for the preceding year by ·13 and than the decennial average ratio

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by 5·38. The principal causes of discharge were nervous affections 15 cases or 2·08 per 1,000, (including 3 cases, or ·42 per 1,000, of mental disorder); diseases of the circulatory system 11 cases (including 1 case of disordered action of heart), or 1·53 per 1,000; injuries received in action 8 cases, or 1·11 per 1,000; secondary syphilis 7 cases, or ·97 per 1,000; diseases of the organs of locomotion 6 cases, or ·83 per 1,000, and tubercular diseases and aural affections each 5 cases, or ·69 per 1,000.

OFFICERS.—In an average strength of 251 officers there were 165 admissions, equal to a ratio of 657·4 per 1,000, which is higher than in 1896 by 157·4. There were 4 deaths, viz., one each from enteric fever, remittent fever, apoplexy, and fracture of skull, the latter being due to a bicycle accident. The admissions included 39 for injuries, one being for gunshot wound received in action, 25 for malarial fevers, 20 for diarrhœa, 10 for rheumatic affections, 9 for simple continued fever, and 5 each for synovitis and hepatic disorders. There were 2 admissions for enteric fever, both at Pietermaritzburg, one ending fatally as above noted. 10 officers were invalided, 4 for injuries, 3 for remittent fever, and 1 each for enteric fever, abscess, and boil.

WOMEN.—Out of an average strength of 336 women, 225 attacks of sickness with 2 deaths are recorded. The admission rate was 669·6 and the death rate 5·95 per 1,000, which are lower than the corresponding ratios for 1896 by 7·7 and 2·02 respectively. Among the cases treated were 45 of debility, 24 of diseases peculiar to women, 19 of bronchitis, 18 of dyspepsia, 13 of simple continued fever, 11 of diarrhœa, 10 of rheumatism and 9 of dysentery. The fatal cases were one of dysentery and one of peritonitis. Two cases of enteric fever occurred, one at Pietermaritzburg and one at St. Helena.

CHILDREN.—The average strength was 573, and there were 562 cases of sickness with 17 deaths, equal to ratios of 980·8 and 29·67 per 1,000 respectively, the former being higher by 147·5 and the latter lower by 11·99 than those for the previous year. The chief causes of sickness were bronchitis 144 cases, measles 77 (of which 69 occurred in Pietermaritzburg), diarrhœa 66, debility 34, and simple continued fever 125 cases. No case of enteric fever is recorded. The deaths were 9 from diarrhœa, 3 from eclampsia, and 1 each from measles, dysentery, bronchitis, pneumonia and tonsillitis.

VACCINATION.—All vaccinations were performed with the preserved lymph obtained from the Government Bacteriological Institute at Grahamstown; 75 out of 117 primary vaccinations amongst children were failures. Of 73 re-vaccinations amongst the men, 10 amongst the women and 30 amongst the children, failures were recorded in 23, 3, and 7 cases respectively.

II.—NON-EUROPEAN TROOPS.

The headquarters and two companies of the 3rd Battalion West India Regiment relieved the company of the 1st Battalion Leicester Regiment at St. Helena on the 2nd December. The average annual strength of the non-European troops was 19, and there were 19 admissions into hospital and 1 death. The admissions included 3 for remittent fever contracted in West Africa or the West Indies, 4 for venereal diseases, and 3 for rheumatism. The death was due to enteritis.

SANITARY CONDITIONS.

The Principal Medical Officer (Surgeon-Colonel J. W. Maxham, M.D.) notes that great improvements have taken place at *Cape Town*. The new drainage system of the town has not yet been completed but

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considerable progress has been made. In the Main barracks a new officers' mess and quarters have been constructed, the old mess has been allotted as a serjeants' mess and the old quarters converted into cookhouses, bath-rooms with ample bath accommodation, latrines, stores and offices. A portion of a dilapidated old latrine was noted as still remaining. One barrack block, with lavatory adjoining, was completed during the year, to accommodate 195 men ; also two new blocks of married quarters, to accommodate 18 families. Altogether 43 families have been placed in new married quarters during 1896 and 1897, but a few have still to live in hired houses in the town. The ventilation of the south-east side of the Castle quarters has been improved by levelling a large block of buildings used as stables. Satisfactory arrangements were made for keeping the foreshore near the station hospital clean.

The condition of *Wynberg* was considered in every way conducive to health during the year, the garrison of the camp having been considerably reduced by the removal of a battalion of infantry to King William's Town and Grahamstown. The quartering of married families in hired buildings at a distance from barracks has been remedied. "The quantity of water (surface, ablution, &c.) to be disposed of can now be efficiently dealt with." The want of wards for lunatics and infectious diseases is specially noted by the Medical Officer in charge of the station hospital, who also records the difficulty that the men experience in drying their clothes in wet weather.

At *Simons Town* the health of the troops and civil population is again reported to have been very good, notwithstanding the insanitary condition of the portion of the town, known as the "brook," in the vicinity of the Palace Barracks. During the summer months the refuse from the houses accumulates in the dried up bed of the stream, and becomes very objectionable. A new kitchen has been constructed in connection with the hospital.

Grahamstown, which was re-occupied as a military station in May, by a half-battalion of infantry, after a lapse of 25 years, contains the old Drostdy Barracks, which are solidly built and roofed with slate. New barracks are in course of construction ; and, during the year, a cook-house, bath-room and latrine were completed. The station is generally noted as healthy but for the severity of venereal disease, from which the troops suffered considerably. A dry earth system of conservancy is in use, but many of the civil habitations have old privies and middens. The surface drainage generally is unsatisfactory and constitutes the chief sanitary defect in connection with the barracks. Water is obtained from the municipal reservoirs at some distance from the town. It contains much sediment at times and requires filtering, and in the dry season the supply is scarce and has to be supplemented by well water, many of the houses being provided with wells. A new water supply system is under construction. The hospital arrangements at Grahamstown are temporary and unsatisfactory, especially as regards cooking, ablution and drainage. The cells are noted as old-fashioned and in need of alterations. Small-pox and rinderpest are noted as having been prevalent in the town and district during the year.

King William's Town was re-occupied at the same time as Grahamstown with a half-battalion of infantry, its previous occupation as a military station having ceased in 1879. After occupation it was noted that enteric fever was prevalent amongst the Europeans in the town and amongst the natives (Kaffirs) living in kraals in the surrounding district. As already noted, cases occurred also amongst the troops. Venereal disease was also severe after the arrival of the troops in the station, but diminished considerably on steps being taken to prevent native women from coming near the barracks. The climate is said to be treacherous on account of the great diurnal variation of temperature. The troops occupied the old barracks, consisting of officers' mess, eight blocks of single storied buildings, including the hospital, and a building in the form of a square containing barrack rooms, married quarters and stables. The buildings are of brick on stone foundation and roofed with slate or galvanised iron, covered with thatch. The buildings and outhouses generally were in good sanitary condition. Water is laid on from the municipal water supply, the source being the Buffalo River, at a point about ten miles above the town. It is considered satisfactory. A source of danger to the health of the troops arose from keeping the contractor's carts,

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used for removing night soil from the town and barracks, in a shed close to the latter. Cases of enteric fever occurred both in the family of the contractor and amongst natives employed by him.

At *Pietermaritzburg* enteric fever was, as in previous years, very prevalent. Although no definite cause for this continued prevalence of enteric fever can be assigned, the sanitary condition of the locality appears to leave much to be desired, especially in respect to the prevention of soil pollution. The drainage is reported to have been greatly improved by the construction of large well built brick drains, but many of the poorer houses are without drains of any description, and slop-water, &c., is allowed to sink into the ground around the dwellings. In barracks and camps, the surface drainage is noted as being equally unsatisfactory, the channels being concreted for a short distance only. The water supply is scarce, especially at the higher levels, and a new water tower is being constructed to remedy the defect. The latrines and floors need concreting. The galvanized iron huts are hot and require improved ridge ventilation. A portion of the garrison was under canvas during the year, but several additional huts are in course of construction. Many of the married families live in hired houses in the town, but the arrangement is considered inconvenient, as it leads to insufficient sanitary supervision and consequent increase in the amount of sickness. The means of ablution have been improved during the year by the addition of several new baths and basins. The hospital arrangements are very inadequate; all the available space in the hospital grounds are occupied by marquees, and the cavalry barracks are also used as hospital wards. The cooking ranges are too small and the surface drainage unsatisfactory.

Ladysmith was occupied as a new military station in May. The site of the camp is much exposed, without trees or vegetation, about 2 miles west of the town. "In windy weather," writes the Principal Medical Officer, "dust storms are severe, and in wet weather the mud is ankle deep. The men have been under canvas (bell tents) and have had a great deal of discomfort. The health of the troops has not been satisfactory since October. They have suffered from enteric fever and continued fevers, dysentery and ague, severely." The bell tents afforded poor protection against the heavy rains and storms. They were often blown down, owing to the nature of the ground in places being unsuited for tent pegs; and sometimes they were swamped with rain. Huts of wood and iron are now in process of construction. The water to the troops is distributed by water carts, which are filled at a large tank connected by iron pipes with the municipal reservoirs situated near the camp. The reservoirs are fed by the Klip River, and the water is stated to be muddy during the summer months. It has been filtered and boiled before issue to the troops. A small spring close to the camp, which the men were found to be using in September, was condemned on account of its unsatisfactory surroundings. There is a pail system of conservancy, the contents being deposited about a mile north of the camp. There is no proper drainage for the removal of surface and waste water. Two slaughter-houses in the vicinity were regarded as unsatisfactory and one of them has been vacated.

No changes have taken place in the sanitary condition of *Eshowe* during the year. The surface drainage is noted as being rudimentary, the result being much mud in the rains, and dust in the dry weather.

Rhodesia was occupied by a detachment of British Cavalry from the 1st January till the 21st October, when the troops returned to Natal viâ Beira. From January 1st to June 25th they were encamped near Bulawayo. The men were housed in huts, "wattle and daub"; beds were provided, and the accommodation was in every way satisfactory. During the above period water was obtained from two deep wells situated in the camp. The water was very good and sufficient in quantity. Trenches were dug near the camp and care was exercised with regard to their cleanliness. Subsequently latrines were constructed with buckets and dry earth, which was found to answer admirably. The following buildings were also erected of "wattle and daub," with galvanized iron roofs:—canteen, guard room, reading room, quarter master's store, ablution room.

While in Bulawayo, slight cases of sickness were treated in the camp

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non-dieted hospital. This was built on the same lines as the other buildings referred to above, and answered the purpose excellently. Serious cases were treated in the Civil Hospital, Bulawayo.

For the remainder of the time spent in Rhodesia, viz., from June 25th to October 21st, the troops were employed on field service in Mashonaland, conducting operations against the rebels. During this period the men lived entirely in the open air, and their health was excellent. Climate was warm but not oppressive, and water was generally abundant and good.

St. Helena was occupied by both European and non-European troops, the 3rd Battalion of the West India Regiment occupying Jamestown barracks in December. The sanitary conditions generally are regarded as satisfactory, but the surface drainage and barrack flooring are noted as being defective. At Jamestown barracks a new latrine has been constructed over the main culvert, the contents being carried immediately out to sea.

X.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF MAURITIUS.

Sickness and Mortality.

I.—European Troops.

Mauritius.

The average strength of warrant officers, non-commissioned officers and men serving in the Command during the year was 756. The garrison throughout the year consisted of the 24th Company, Western Division, Royal Artillery, which left for Malta on the 28th December on relief by the 25th Company of the same division from South Africa, and detachments of the Royal Engineers, Medical Staff Corps, Army Ordnance Corps, and Garrison Staff.

The headquarters and half of the 2nd Battalion York and Lancaster Regiment left the Command on the 2nd February, having been relieved by the headquarters and half of the 1st Battalion King's Royal Rifle Corps, which arrived from South Africa after being shipwrecked *en route* upon the Island of Reunion, on the 14th January, while on board the Royal Indian Marine s.s. "Warren Hastings." The remaining half of the 2nd Battalion York and Lancaster Regiment was also on board and shipwrecked at the same time. After the wreck, which was not attended with loss of life, the shipwrecked troops were taken on to Mauritius by other vessels, and remained there until 2nd February, when the whole of the 2nd Battalion York and Lancaster Regiment, proceeded to India.

The admission, mortality and invaliding rates among the troops forming the garrison are shown in the following table :—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
756	881	6	1	7	38	4	60·60	1165·3	9·26	50·26	5·29	80·16

The admission rate is lower than in 1896 by 16·6, and the constantly sick rate by 2·53 per 1,000, but the death rate is higher by ·38. In comparison with similar average ratios for the preceding ten years, the admission rate has declined by 199·1 and the death rate by 5·78, but the constantly sick rate has increased by 6·40 per 1,000. It is observed that the constantly sick rate for the year under review was increased by the presence of 76 sick transferred to the Station Hospital at Curepipe after the wreck of the "Warren Hastings." The average sick time to each soldier was 29·26 days, which is shorter than in 1896 by one day, but longer than the average period for the preceding ten years by 2·34 days. The average duration of each case of sickness was 25·10 days, half a day shorter than in the previous year, but 5·37 days longer than the decennial average period. These two calculations were also unfavourably influenced by the wreck of the "Warren Hastings."

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In Abstract XXVI is a table showing these health statistics for the several regiments and corps which served in the Command during the year. The admission rate in the Royal Artillery, 1588·7, and the constantly sick rate, 91·93 per 1,000, compare favourably with 1805·5 and 131·04 in the previous year. In the Infantry these rates were 1176·7 and 83·38, as compared with 1035·6 and 73·12 in 1896. Of the deaths 5, or 9·40 per 1,000, occurred in the Infantry, and 1, or 8·06 per 1,000, in the Royal Artillery.

With regard to the influence of age on sickness and mortality, it is calculated that among men under 20 years of age, average strength 29, the sick rate was 1034·5 per 1,000, but there was no death; among men between 20 and 25 years of age the admission and mortality rates were 1656·2 and 4·46 per 1,000 respectively, as compared with 1468·8 and 10·83 in the previous year; among men between 25 and 30 years of age the admission rate was 992·7 and the death rate 7·26 per 1,000, both higher than the previous year's ratios; and among men over 30 years of age, with a small average strength, the admission rate was 777·8 and the death rate 22·22 per 1,000.

With regard to service in the Command the admission ratio for men in their first year was 1226·0 per 1,000, an increase of 117·2 on the corresponding rate in the previous year; among men in their second year of service the ratio was 524·4 per 1,000, as compared with 1469·2 in the preceding year; among men in their third year, average strength 70, the ratio was 1242·8 per 1,000, and for men with over three years' service in the Command, whose average strength was only 20 with 35 admissions, 1750·0 per 1,000. Of the 6 deaths in the Command, 5, or a ratio of 8·56 per 1,000, occurred among men in their first year of service, and 1, or 14·29 per 1,000, among men in their third year of service.

In Abstract No. XI is a table showing the principal statistics of sickness and mortality arranged according to the various sections of disease.

GENERAL DISEASES.—*Eruptive fevers* were represented by a single case of cow-pox, and there were 3 admissions for *influenza*.

Enteric fever caused 8 admissions and 4 deaths, the latter including that of a man from the Command who died in Cape Town. The admission ratio was 10·6 per 1,000, which is lower than that for 1896 by 4·2, and than the average rate by 4·1. The death rate, 5·29 per 1,000, is higher in the two comparisons by ·85 and ·34 respectively. The percentage of mortality to attack was 50·0, as compared with 30·0 in 1896 and with 33·7, the average percentage for ten years. Seven of the cases were admitted from Curepipe Camp and one from the Line Barracks at Port Louis. Of those from Curepipe, two of the men contracted the disease in Port Louis, where they had been stationed a short time before admission, the opening of the municipal drains near to their sleeping rooms being the supposed cause; two others had also been quartered at Port Louis till within a few days of their admission, but it is believed that they contracted the disease at Reunion, where they were landed after the wreck of the "Warren Hastings"; the other three men had not been absent from the camp for some time and no definite cause could be stated. The man admitted from the Line Barracks at Port Louis is believed to have contracted the disease at Cape Town. He was admitted to hospital on the third day after his arrival in Mauritius from that station.

Dysentery caused 4 admissions, the ratio 5·3 per 1,000, being lower than that for the previous year by 13·9, and than the average rate by 11·4. There was no death.

Malarial Fevers.—There were 307 admissions, 292 being for ague and 15 for remittent fever. Amongst the latter there was one death. The admission rate was 406·1 per 1,000, which is less than in 1896 by 25·9 and than the decennial average rate by 202·1. The average number constantly sick for these fevers was equal to 18·84 per 1,000, which is lower than in 1896 by 7·48 and than the average rate by 7·68. More than one-third of the cases occurred in the months of February and March, and the disease was almost invariably contracted in Port Louis, or occurred among men who had previously suffered from malarial fever in India or elsewhere.

For *tubercular diseases* there was only one admission, namely, for tubercular disease of the lung.

Venereal Diseases.—The admissions for *primary syphilis* were 26 in number

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equal to a ratio of 34·4 per 1,000, which is below the corresponding rate for 1896 by 4·0. If to this be added the sickness for soft chancre, which caused 38 admissions and the constant inefficiency of 3·83 men, the admission rate for primary venereal sores equalled 84·6 per 1,000, which is above the previous year's rate by 10·7 but fractionally below the average. *Secondary syphilis* caused 18 admissions, or a ratio of 23·8 per 1000, as compared with 48·8 in 1896 and with 33·9, the average rate. *Gonorrhœa*, with 120 admissions, gave a ratio of 158·7 per 1,000, which is higher than that for the preceding year by 25·6, and than the average rate by 52·7. Taking all these forms together the total admission rate for venereal diseases was 267·1 per 1,000, which is higher than the previous year's rate by 11·3 and than the average ratio for the preceding ten years by 42·1. The total amount of constant inefficiency on account of these diseases was equal to 26·24 per 1,000, an increase of 1·54 on the ratio for 1896 and of 9·41 on the average rate.*

Parasitic Diseases.—There were 3 admissions, all for scabies.

Rheumatism caused 11 admissions or a ratio of 14·5 per 1,000, which is above the previous year's rate by 1·2, but below the average rate by 5·5. There was no case of rheumatic fever.

Debility was the cause of 4 admissions, and the cases shown under *other general diseases* comprised 12 of mumps, 4 of non-malignant new growth and 1 of cyst. On the arrival of the s.s. "Raglan Castle" in June with a draft for the King's Royal Rifle Corps and other details, 4 cases of mumps were landed and sent to hospital, the remainder of the new arrivals being isolated and inspected daily. After the occurrence of 8 fresh cases the outbreak ceased.

LOCAL DISEASES.—*Diseases of the Nervous System* were the cause of 7 admissions, or a ratio of 9·3 per 1,000, which is above that for the previous year by 4·9, but 1·5 below the average rate. The cases were 6 of neuralgia and 1 (fatal) of paralysis.

There was only one admission for *diseases of the eye*, and under the heading of *diseases of other organs of special sense* are returned 11 cases of inflammation of the external meatus.

Diseases of the Circulatory System with 7 admissions gave a ratio of 9·3 per 1,000, which is in excess of the previous year's rate by 1·9, but below the average ratio for the preceding ten years by 3·7. The admissions were 4 for valvular disease of the heart, one each for degeneration of the heart (fatal), disordered action of the heart and varix.

Diseases of the Respiratory System caused 37 admissions, the ratio, 48·9 per 1,000, being higher than that for 1896 by 35·6 and than the average rate by 26·3. The admissions were 35 for bronchitis and 1 each for spasmodic asthma and pneumonia.

Diseases of the Digestive System.—There were 83 admissions, equal to a ratio of 109·8 per 1,000, which is below that for the previous year and the average rate by 2·6 and 1·5 respectively. The principal causes of admission were affections of the mouth and throat 24 cases, diarrhœa and dyspepsia each 17 cases, and hepatic diseases 10 cases.

Diseases of the Lymphatic System with 24 admissions gave a ratio of 31·7 per 1,000, which is lower than that for 1896 by 8·2 and than the average rate by 11·8.

Diseases of the Generative System gave a ratio of 64·8 per 1,000, which is higher than the previous year's rate by 23·4 and than the average rate by 8·1.

There were two admissions recorded for *diseases of the organs of locomotion*, and *diseases of the connective tissue* gave an admission rate of 15·9 per 1,000, which is below that for the previous year and the decennial average rate by 1·9 and 3·7 respectively.

Diseases of the Skin.—33 admissions are returned, or a ratio of 43·7 per 1,000, which is in excess of the average rate by 1·9.

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* There were 3 admissions for ulcer of penis of non-venereal origin, with ·08 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 271·1 and 26·85 respectively.

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INJURIES.—There were 88 admissions, all for local injuries, the ratio, 116·4 per 1,000, being below the previous year's rate by 9·3 but above the average rate by 7·5. The cases included 38 of wounds, 23 of sprains, and 14 of contusions.

POISONS.—There was one mild case of poisoning caused by eating tinned ham.

INVALIDING.—The number of men invalided home during the year was 38, being in the ratio of 50·26 per 1,000, which is lower than the corresponding rates in the preceding year and decennial period by ·04 and 5·68 respectively. Of the men invalided, 12, or 96·77 per 1,000, belonged to the Royal Artillery; 22, or 41·35 per 1,000, to the Infantry; and 4, or 55·55 per 1,000, to the Royal Engineers. With regard to age, 2 men, or 68·96 per 1,000, were under 20 years of age; 17 men, or a ratio of 75·89 per 1,000, were between 20 and 25 years of age; 12 men, or 29·05 per 1,000, were between 25 and 30 years of age; and 7 men, or 77·78 per 1,000, were over 30 years of age. As regards service in the Command, 24 men, or 41·10 per 1,000, were in their first year; 3 men, or 36·58 per 1,000, were in their second year; 10 men, or 142·86 per 1,000, were in their third year, and 1 man, or 50·00 per 1,000, had been more than three years in residence. The causes of invaliding were malarial fevers 21 cases, valvular disease of heart and inflammation of glands 3 each, secondary syphilis 2. rheumatism 2, and tubercle of lung, primary syphilis, gonorrhœa, debility, hepatitis, soft chancre, and sprain one case each. The number of men finally discharged as medically unfit was 4, equal to a ratio of 5·29 per 1,000, which is less than the previous year's rate by 3·59 and than the average rate by 12·13. The causes of discharge were tubercle of lung, primary syphilis, disordered action of heart, and flat foot, one case each.

OFFICERS.—The average strength was 36, and there were 27 admissions, equal to a ratio of 750·0 per 1,000, which is higher than in 1896 by 103·0. The admissions included 16 for malarial fevers, as compared with 6 in the previous year, and 2 for enteric fever. Both the latter cases occurred in officers residing at Curepipe Camp, and infected milk supply was regarded as being the probable cause of the attacks, which were simultaneous. Three officers were invalided 2 for malarial fever, and 1 for enteric fever. There were no deaths.

WOMEN.—The average strength was 52, the number of admissions 50, and there were 3 deaths. The admission ratio, 961·5 per 1,000, shows an increase of 253·2 on the rate in the previous year. There were no deaths in 1896. Two cases of enteric fever occurred at Curepipe Camp, both ending fatally. No definite cause for the attacks could be ascertained. Among the remaining causes of sickness, debility accounted for 20 cases, malarial fevers 10 cases and 1 death, and diarrhœa 3 cases.

CHILDREN.—The average strength was 66, the number of admissions 39, and there were 2 deaths. The sick and mortality rates, 590·9 and 30·30 per 1,000, are both lower than in the preceding year, by 50·9 and 44·32 respectively. The chief causes of sickness were malarial fevers, debility, influenza, diarrhœa, and dysentery. One death was due to diarrhœa, and the other to immaturity at birth.

VACCINATION.—All the vaccinations were from preserved lymph, and out of 17 primary vaccinations amongst the children 5 were failures. Of 53 re-vaccinations amongst the men there were 21 failures.

II.—NON-EUROPEAN TROOPS.

The Asiatic troops consisted of the Mauritius Companies, Royal Artillery, average strength 145, and the Mauritius Company, Royal Engineers, average strength 29; the former being composed of men enlisted in India, and the latter raised locally from men of mixed races. The total strength was therefore 174, and there were 285 cases of sickness and 2 deaths, the ratio of admission equalling 1637·9 per 1,000, and that of death 11·49. The prevailing diseases were malarial fevers, which were the cause of 178 admissions, giving a ratio of 1023·0 per 1,000, as compared with 786·0 in 1896, 936·3 in 1895, 1230·4 in 1894, and 1690·6 in 1893. *Mauritius.*

There were 16 admissions for venereal diseases, including 4 for soft chancre, 12 for digestive disorders (including 6 cases of diarrhœa), 9 for bronchitis, 12 for diseases of the connective tissue, 15 for skin affections, and 23 for local injuries. The deaths were due to ague and enteritis respectively. One man was invalided for tubercle of lung.

There were 50 primary vaccinations with 23 failures, and 32 re-vaccinations with 23 failures. Preserved lymph from the Mauritius Health Department was used.

SANITARY CONDITIONS.

The Senior Medical Officer (Brigade-Surgeon-Lieutenant-Colonel J. Fraser, M.D.) in his report attributes most of the sickness amongst the troops in the Command to *Port Louis*. During the hot season, (December to May), the European troops there are relieved monthly, but, notwithstanding this, the admissions to hospital amongst them numbered 279 out of an average strength of 198.

The town of Port Louis is situated on a low-lying alluvial and much polluted plain, without proper systems of drainage or conservancy. It is supplied with water from a river fed by streams passing through a polluted and insanitary area, and these conditions, along with the general insanitary state of the town and harbour, favour the production of the malarial and other fevers, which are so prevalent in the town. Although the work is proceeding very slowly, a drainage system is being constructed, and it is hoped that the Mare-aux-Vacoas water, which is the best in the island, will eventually be supplied, the water having already been carried to within a short distance of Port Louis. The barracks occupied by European troops are Forts George and Adelaide, while the Line Barracks in the centre of the town are occupied by non-European troops. At Fort George the surface drainage has been extended, and the foul drainage system is reported to act fairly well, although the drains are properly emptied at low tide only. The drain from the married quarters empties into a tank near the officers' mess and creates a nuisance there. An additional urinal was provided in the Fort, and the floor of the men's latrine was concreted during the year. At Fort Adelaide, additional bath accommodation was provided. In Line Barracks additional bath accommodation was also provided, and one of the latrines for Asiatics remodelled. The remaining latrine is considered most insanitary, owing to faulty construction. There is a scheme for draining these barracks in connection with the town drainage scheme, but it has not yet been commenced. The surface drainage is also defective.

Pasteur-Chamberland filters have been used in all the Port Louis barracks, but the number has been insufficient and additional filters have been sanctioned. The filters are noted as getting easily out of repair.

At *Curepipe* the jungle in the vicinity was extensively cleared during the year. A drying room was erected in connection with the new barracks, and a kitchen provided for the sergeants' mess. Minor improvements were effected at the Station Hospital, and bath rooms and additional latrine accommodation were being provided for the married quarters. A wash-house and drying-room are noted as requirements for these quarters. It is also noted that the guard room requires enlarging. The accommodation at the Station Hospital is insufficient for the sick, and for administrative work is most limited and unsatisfactory, there being two small rooms only for the latter purpose, one having to be used as a common room for the medical officers and for disposing of the morning sick, prisoners, &c., and the other for the quartermaster and clerical staff. During the year a married quarter was temporarily re-appropriated and comfortably furnished as a ward for

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sick women and children, and a matron appointed. It was opened on the 31st August, and has supplied a long felt want. The water supply of Curepipe Camp is partly Mare-aux-Vacoas water, which is laid on to the old barracks, and partly rain water, which is laid on to the new barracks and married quarters, from storage tanks, where it is filtered through sand and gravel. It is noted that there is electric light installation within ¼ mile of the barracks, and its extension to them is recommended.

The rations throughout the Command are generally satisfactory, but with regard to non-European troops, the medical officer in charge notes that the local companies, R.A., have a supplementary daily issue of lime juice and potatoes as their rations are deficient in antiscorbutics, and that the local companies, R.E., get no rations but have a supervised system of messing to ensure a variety and sufficiency of food.

XI.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF CEYLON.

SICKNESS AND MORTALITY.

I.—EUROPEAN TROOPS.

Ceylon.

The average strength of warrant officers, non-commissioned officers, and men was 1,324. The force comprised Nos. 6 and 37 Companies, Southern Division, Royal Artillery, half the 41st (Fortress) Company, Royal Engineers, the 1st Battalion Loyal North Lancashire Regiment, and detachments of the Army Service, Medical Staff, Army Ordnance and Army Pay Corps and Garrison Staff. The distribution of the troops in the three stations of the Command was as follows:—At Colombo, No. 37 Company, Southern Division, Royal Artillery, the headquarters of the Infantry battalion, and a small detachment of the Royal Engineers; at Trincomali, No. 6 Company, Southern Division, Royal Artillery, the major portion of the Royal Engineers, and a detachment of infantry; at Kandy, a detachment of infantry. The men of other corps were distributed in proportion throughout the three stations. A sanatorium was opened at Newera Eliya during the year, the station being occupied from February until May, and again from September until the close of the year.

The following table shows the admission, mortality and invaliding rates, &c., among the troops in the Command.

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids Sent Home.	Invalids finally Discharged.	Constantly Sick.
1,324	1,443	7	1	8	14	8	75·76	1089·9	6·04	10·57	6·04	57·22

The admission, mortality, and constantly sick rates are lower than those for 1896 by 231·2, 2·19, and 7·69 per 1,000 respectively. In comparison with average ratios for the preceding ten years the admission rate has increased by 61·9, but the death rate is lower by 5·06 and the constantly sick rate by 1·07. The average sick time to each soldier was 20·89 days, which is shorter than in the previous year by 2·87 days, and than the average period for the preceding ten years by ·38 of a day. The average duration of each case of sickness, 19·16 days, was longer in the former comparison by 1·18, but shorter by 1·53 days in the latter.

In Abstract XXVI is a table showing these statistics for the various corps which served in Ceylon during the year, from which it will be seen that the admission rate for the Royal Artillery was 663·9, for the Royal Engineers 747·0, for the Infantry 1261·5, and for other corps 250·0 per 1,000. Of the 8 deaths, 2 occurred in the artillery, 1 in the engineers, and 5 (including that of the invalid) in the infantry, the respective ratios being 8·30, 12·05, and 5·21 per 1,000. The ratio of constant inefficiency was 40·41 in the artillery, eylon.

29·16 in the engineers, 65·78 in the infantry, and 11·25 per 1,000 among men of other corps.

The admission rate according to age was 400·0 among men under 20 years, 1421·4 among men between 20 and 25, 855·1 among those between 25 and 30 years, and 466·7 per 1,000 among men of 30 years of age and upwards. In 1896 the highest ratio was also among men between 20 and 25, but the lowest occurred among men over 30 years of age. There was no death among men under 20 years; 2 deaths, or 2·86 per 1,000, occurred among men between 20 and 25; 2, or 4·83 per 1,000, among men between 25 and 30; and 3 deaths, or 20·00, among men of 30 years of age and upwards. In the previous year the highest mortality rate was among men under 20 years and the lowest among men between 20 and 25 years of age. As to service in the Command, the admission rates were 1181·6 among men in their first year, 1122·9 among those in their second year, and 586·4 among men in their third year in Ceylon. Among men who had been more than three years in the Command, the admission rate was 2086·9, but with an average strength of only 23. In the previous year the highest ratio was among men in their third year, and the lowest among men in their second year. There was one death, or 2·79 per 1,000, among men in their first year, 4 deaths, or 5·12 per 1,000, among men in their second year, and 2 deaths, or 12·35 per 1,000, among men in their third year. In 1896 the highest ratio was among men in their first year, and the lowest (*nil*), among men in their third year.

In Abstract No. XII is a table showing the principal statistics of sickness and mortality arranged according to the various sections of disease.

GENERAL DISEASES.—*Eruptive Fevers* were represented by 2 admissions, one for chicken-pox and one for measles. *Enteric fever* was the cause of 4 admissions and 1 death, the admission ratio, 3·0 per 1,000, being lower than the previous year's rate by 1·5 and than the average rate for the preceding ten years by 4·5. Three of the cases occurred at Kandy and one at Colombo, but in no instance could the disease be traced to any insanitary condition in barracks, being probably contracted in the native villages. It is noted, however, that the water supply of Kandy is open to suspicion, as the streams supplying the municipal reservoir flow through coolie lines and a well-manured tea estate. On analysis it was found fit for use, but the whole question of water supply is under consideration.

Simple Continued Fever.—There were 38 admissions equal to a ratio of 28·7 per 1,000, which is above that for 1896 by 16·7, but below the average rate by 28·0. All but four of the cases occurred at Colombo.

Dysentery caused 17 admissions, the ratio, 12·8 per 1,000, being less than the previous year's rate by 5·2 and than the average rate by 8·2. Twelve of the admissions were at Colombo, all in men who had been between one and two years in the Command.

Malarial Fevers were the cause of 349 admissions, or a ratio of 263·6 per 1,000, which is below that for the previous year by 25·3, but in excess of the average rate by 195·8. There were 3 deaths, all from remittent fever. The cases were 330 of ague and 19 of remittent fever. These fevers were especially prevalent at Trincomali, where there were 261 cases of ague and 12 of remittent fever.

The medical officer in charge at Trincomali reports that the outbreak of malarial fevers there "commenced during the second week in March and increased steadily, gaining its highest the latter end of April, and the admissions fell very rapidly by the end of May. Nearly all the cases came from Ostenburg, Fort Frederick being very free." The outbreak is accounted for by the fact that the men at Ostenburg were employed up to the end of March cutting jungle; a very large tract of which was opened up. The soil had previously been saturated by rains which had come late in the season. There were two blocks of buildings to leeward of the cleared patch, one of them occupied by a detachment of the North Lancashire Regiment, and the other by the married families; more than half the admissions came from the former block, while not a single person occupying the latter escaped. Many of the cases were of a very severe type, with abnormally high temperatures. There was only one death, however, the patient being a heavy drinker and dying with hyper-pyrexia during the course of an attack of remittent fever.

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Septic Diseases.—There was one fatal case of pyæmia.

Tubercular Diseases were represented by a single admission for tubercle of lung, and an invalid died from this affection.

Venereal Diseases.—For *primary syphilis* there were 134 admissions, equal to a ratio of 101·2 per 1,000, as compared with 137·0 in 1896. If to this be added the sickness from soft chancre, (for which there was only one admission, with ·02 constantly sick), the total admission ratio for primary venereal sores was 101·9 per 1,000, which is lower than the previous year's rate by 53·1 and than the average rate by 44·2. *Secondary syphilis*, with 54 admissions, gave a ratio of 40·8 per 1,000, which is lower than that for 1896 and the average rate by 6·4 and 13·9 respectively. *Gonorrhœa* caused 169 admissions, or a ratio of 127·7 per 1,000, which is less than that for the previous year by 21·2 and than the average rate by 1·3. The total admission rate for all forms of venereal disease was 270·4 per 1,000, as compared with 351·1 in the previous year and with 329·8, the decennial average rate. The ratio constantly sick from these diseases was 21·19 per 1,000, which is lower than that for 1896 by 3·58, and than the decennial average rate by 1·87.*

The great decrease in venereal disease occurred chiefly at Trincomali, where there were only 6 admissions for primary syphilis and 21 from gonorrhœa as compared with 32 and 31 respectively in 1896. The reason of this is attributed to the fact that "there are very few prostitutes in Trincomali," and it is reported that "most of the cases there came from Colombo."

Parasitic Diseases.—There were 48 admissions, of which 41 were for ringworm. The ratio, 36·3 per 1,000, is in excess of the average rate by 26·1. Twenty-five of the cases of ringworm occurred at Trincomali and were supposed to have originated in the tanks where the clothes were washed.

Alcoholism caused 6 admissions, of which 3 were at Colombo, 2 at Trincomali, and 1 at Kandy. No case of delirium tremens is recorded.

Rheumatism.—20 admissions are returned, including 3 for rheumatic fever. The ratio was 15·1 per 1,000, which is lower than that for the previous year by 5·1 and than the average rate by 3·0.

Debility.—There were 20 admissions for debility or a ratio of 15·1 per 1,000, which is less than in 1896 by 7·4 and than the decennial average rate by 15·8.

Other General Diseases.—The cases shown under this heading were 8 of non-malignant new growth.

LOCAL DISEASES.—*Diseases of the Nervous System* caused 6 admissions, the ratio, 4·6 per 1,000, being less than that for the previous year by 1·3 and than the average rate by 5·3. The cases were 3 of neuralgia and one each of epilepsy, hysteria, and dementia.

Diseases of the Eye with 16 admissions, gave a ratio of 12·1 per 1,000, which is lower than the previous year's rate by ·6, and than the average rate by 1·2. Conjunctivitis furnished 12 of the admissions. For *diseases of other organs of special sense* there were 22 admissions, of which 17 were for inflammation of the external meatus, the equivalent ratio being 16·6 per 1,000, which is below that for the previous year by 5·1, but fractionally above the average rate.

Diseases of the Circulatory System.—There were 13 admissions, or a ratio of 9·8 per 1,000, which is higher than that for 1896 by 3·1 and than the average rate for the preceding ten years by 1·5. The cases were 7 for disordered action and 4 for valvular disease of the heart, and 2 for varix.

Diseases of the Respiratory System contributed 15 admissions, the ratio, 11·3 per 1,000, being less than that for the preceding year by 1·4 and than the average rate by 13·1.

Diseases of the Digestive System caused 84 admissions and 2 deaths. The admission ratio, 63·4 per 1,000, is lower than the previous year's rate by 27·9, and than the average rate by 34·2. Among the cases treated were 24 of

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* There was 1 admission for ulcer of penis of non-venereal origin, with ·03 men constantly sick. If, as in former years, this case was included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 271·1 and 21·21 respectively.

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affections of the mouth and throat, 21 of hepatic affections, including 2 fatal cases of abscess of the liver, 12 of piles, and 11 each of dyspepsia and diarrhœa.

Diseases of the Lymphatic System were the cause of 66 admissions, equal to a ratio of 49·8 per 1,000, which is below the previous year's and average rates by 7·8 and 12·9 respectively. The ratio of constant inefficiency from this cause was 5·66, as against 5·38 and 6·63 in the two comparisons. There were 40 cases at Colombo, 18 at Kandy, 4 at Newera Eliya, and 4 at Trincomali, all of inflammation or suppuration of the lymphatic glands.

Under the heading of *diseases of the urinary system* 4 cases are returned, namely, one case each of acute nephritis, Bright's disease, hæmaturia and inflammation of the bladder.

Diseases of the Generative System with 35 admissions gave a ratio of 26·4 per 1,000, which is less than that for the previous year by 16·3, and than the decennial average rate by 63·5. More than half the admissions (19), were for orchitis. There was only 1 admission for ulcer of penis.

Diseases of the Organs of Locomotion.—There were 18 admissions, of which 13 were for synovitis. The ratio, 13·6 per 1,000, is lower than that for 1896 by 4·4, but above the average rate by 5·5.

Diseases of the Connective Tissue caused 36 admissions, or 27·2 per 1,000, as compared with 47·2 in the previous year and with 29·2, the average rate. Of the cases, 29 were due to abscess and 7 to inflammation of the connective tissue.

Diseases of the Skin.—There were 133 admissions, equal to a ratio of 100·5 per 1,000, which is above the average rate for the preceding ten years by 29·6. The chief causes of admission were boils, ulcers, eczema, and whitlows.

INJURIES were the cause of 121 admissions, the equivalent ratio, 91·4 per 1,000, being lower than that for 1896 by 17·1 and than the average rate by 3·3. Wounds, sprains, and contusions accounted for three-fourths of the admissions. There was no admission for general injury, and no death occurred.

INVALIDING.—The number of men invalided to England was 14, equal to a ratio of 10·57 per 1,000, which is lower than the previous year's rate by 12·63, and than the average rate by 9·78. Of the men invalided, 2, or 8·30 per 1,000, belonged to the Artillery, and 12, or 12·50 per 1,000, to the Infantry. As to the ages of the men sent home, 1 man, or 16·67 per 1,000, was under 20 years of age, 8 men, or 11·43 per 1,000, were between 20 and 25, 4 men, or 9·67 per 1,000, were between 25 and 30 years, and 1 man, or 6·67 per 1,000, was over 30 years of age. In 1896 there was no man invalided under 20 years of age, and the ratios for the succeeding age-groups were 25·53, 22·12, and 20·83 per 1,000 respectively. With regard to service in the Command, 4 men, or 11·18 per 1,000, were in their first year, as compared with 27·35 in the previous year ; 8 men, or 10·24 per 1,000, were in their second year, as compared with 8·03 ; and 2 men, or 12·35 per 1,000, were in their third year, as against 15·62. No invaliding occurred among men with more than three years' service in Ceylon, the ratio for the previous year in this group being 27·52 per 1,000. The principal causes of invaliding were malarial fevers, gonorrhœa, perforation of membrana tympani, and disordered action of the heart, 2 cases each. The Senior Medical Officer notes that for the first time for nine years no cases of primary or secondary syphilis have been invalided from the Command, and attributes this to the use of hypodermic injection of mercury. There were 8 men discharged the service as medically unfit during the year, the ratio being 6·04 per 1,000, as compared with 7·48 in 1896 and with 11·42, the average rate for the preceding ten years. Two men were discharged on account of perforation of the membrana tympani, and one each for debility, nystagmus, valvular disease of heart, disordered action of heart, abscess of liver, and synovitis. The marked decrease in invaliding during the year is attributed in a great measure to the establishment of a sanitarium at Newera Eliya. The cases sent up were from amongst the most debilitated men at Colombo and Trincomali, and they are reported to have returned to duty in robust health after their stay at the hill station.

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Officers.—The average strength was 55, and there were 40 cases of sickness and 1 death, equal to ratios of 727·3 and 18·18 per 1,000 respectively, as compared with 788·5 and 19·23 in the preceding year. The cases included 11 of malarial fever, 6 of skin affections, 5 of synovitis, 5 of injuries, and 2 each of dysentery, bronchitis, and abscess. The death was due to a gun-shot wound of chest, self-inflicted, and the cause of the temporary insanity which induced the act of suicide was attributed to excessive physical training. No officer was invalided during the year.

Women.—In an average strength of 65 there were 87 cases of sickness, of which number malarial fevers caused 19 and debility 38. The admission ratio was 1338·5 as compared with 895·5 in 1896. No death occurred.

Children.—There were 57 cases of sickness and 4 deaths in an average strength of 109 children, the ratios of admission and mortality being 522·9 and 36·70 per 1,000 respectively, as compared with 676·5 and 68·63 in the preceding year. Malarial fevers furnished 19 cases, simple continued fever, 7, debility 6, and bronchitis and dysentery 3 cases each. Two of the deaths were due to tetanus and one each to debility and eclampsia.

Vaccination.—There were no vaccination operations among women. Amongst the men there were 1 primary vaccination and 2 re-vaccinations, all successful. Of 30 primary vaccinations and 1 re-vaccination among the children, 13 of the former were failures. All the operations were with preserved lymph.

II.—ASIATIC TROOPS.

The Asiatic troops comprised the two Ceylon companies, Royal Artillery, average strength 163, and the Ceylon Company, Submarine Miners, Royal Engineers, average strength 41, the total strength, therefore, being 204.

A portion of the Artillery was stationed at Colombo, and the remainder, with the Engineers, at Trincomali.

There were 228 cases of sickness, equal to a ratio of 1117·6, an increase of 201·7 as compared with that for the preceding year, and 5·40 men were constantly sick, the ratio, 26·47 per 1,000, being higher than in 1896 by 5·91. Two deaths occurred, one each from debility and diarrhœa. Two men were invalided, one for debility and one for leprosy.

The average sick time to each soldier, 9·66 days, was longer by 2·13, and the average duration of each case, 8·64 days, by ·45 of a day than in the previous year.

The increase in the amount of sickness is principally due to ague, for which there were 75 admissions, (69 of which were at Trincomali), as compared with 44 in the previous year. Among other cases treated were 16 of simple continued fever, 15 of diarrhœa, 11 of bronchitis, 22 of skin affections and 18 of injury. Venereal diseases accounted for only seven admissions.

SANITARY CONDITIONS.

The Senior Medical Officer (Brigade-Surgeon-Lieut.-Colonel A. W. Duke, M.D.), reports that with the exception of the outbreak of malarial fever in Trincomali, already described, the health of the troops generally has been considered good during the year. At *Colombo* the married quarters have had the wash-house improved and additional baths provided ; a foul linen store has been erected at the Station Hospital, twelve native married quarters were converted into two barrack rooms, and new surface drainage was constructed at Mount Lavinia, along with other minor improvements. It is noted that the troops at Colombo require a place for sea-bathing, Ceylon.

a school-room and a gymnasium. During the year the removal of the latrine soil was undertaken by the municipal authorities.

At *Kandy* considerable improvement appears to have taken place in connection with the matters reported in 1896. The night soil is now buried in trenches three miles distant, a new and sanitary aërated water manufactory has been constructed, there is a dairy attached to the hospital under constant supervision, the food supplies have been better and the municipality is taking steps to remove causes of pollution of the water supply, which is at present derived from springs and streams passing through richly manured tea gardens and densely populated coolie lines. The men have, however, for ablution purposes an ample supply of water conveyed to the wash-house in an iron pipe from a spring close to the barracks. In the barracks themselves it is noted that a new latrine for natives has been constructed, the sergeant's mess has been provided with concrete floors, and other improvements have been made. The chief requirement is an improvement in the drainage of the hospital grounds, which is at present described as being extremely bad.

At *Trincomali* an important improvement has been effected in the lower barracks in Fort Frederick, by removing the end partitions of the verandahs and opening up new doors and windows. The barrack rooms are now described as light and airy, and the cubic space per man has been increased by a re-appropriation of rooms for 4 sergeants and 48 men into rooms for 2 sergeants and 30 men. The wooden floors have been converted into asphalt floors and a wash-house has been added. A new block for 4 married quarters has been erected, similar to and near the block erected in 1896. Another block is under construction; and a bathing place is also being made. Water is no longer carried to the fort by coolie labour but is pumped up daily to a tank on the top of the hill. The new surface drainage completed in 1896 has been very beneficial. At Sober Island a deep well is being sunk, the present water supply being conveyed by hand from a well near the sea. The water supply at the Rifle Esplanade, two shallow wells, is stated to require protection from pollution. Two baths of cement concrete, for venereal cases, were constructed at the Station Hospital. Baths were also added to the married quarters of the Staff and Departments. There was no improvement in the means of recreation or in the vegetable supply. With regard to the latter the Medical Officer in charge states that no improvement is expected "so long as the supply is left in the hands of a contractor, who could not afford to supply anything else than onions and pumpkins at the contract rate." At Fort Ostenburg, however, it is noted that the difficulty in getting fruits and vegetables during the year is due to the merchants no longer bringing them as formerly in exchange for salt, owing to the closing of the Government salt beds near.

Newera Eliya was re-occupied in 1897, for the first time since 1874, when it was abandoned on the recommendation of the Principal Medical Officer, on account of its unsuitability as a military station. Detachments of convalescents from the Loyal North Lancashire Regiment, R.A. and R.E., and duty details of the A.S.C. and M.S.C., were sent there in February and left in May; while other detachments and details were again sent up in September and remained in the station at the end of the year. The band of the North Lancashire Regiment was also sent up during the spring months. The experiment is reported to have "proved a great success, men picking up their strength in a very short time and putting on weight." The climate proved unsuitable to a case of tubercle of the lung, and also to one of valvular disease of the heart, supervening on an attack of rheumatism. No women or children were sent up, as no quarters were available for them. The station is said to be at an elevation of 6,200 feet above sea-level, and consists of a plateau, formerly a lake or marsh, but now well drained, 1½ miles broad, and 3 miles long, surrounded by well wooded hills, on the slopes of which the houses of the European population are situated. There is a lake at the southern end of the plateau. The climate is said to be fine and bracing, but with great diurnal variation of temperature, till the end of May, when the S.W. monsoon breaks and lasts till the end of August. During the period of the monsoon the station is said to be almost uninhabitable on account of the violence of the wind

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and rain. October and November are also said to be wet months, the rain being brought by the N.E. monsoon. In 1897, however, these rains were delayed till the end of November, and December, usually a fine month, was wet. The annual rainfall is said to be 100 inches. Pneumonia is reported to be prevalent amongst the natives and enteric fever is not unknown amongst the European residents and planters in the district.

The old military barracks being at present used as a court house, the troops were housed in the old post office buildings and smaller rooms adjoining, one of the rooms being utilized as a non-dieted hospital of 5 beds. The buildings were considered suitable for temporary use.

Pasteur-Chamberland filters were installed at all the stations during the year, with the exception of Newera Eliya, where the water supply, from a reservoir on the hill side about half a mile distant, is said to be pure, abundant and not liable to pollution.

XII.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA.

SICKNESS AND MORTALITY.

I.—EUROPEAN TROOPS.

hina. The average strength of the troops serving in the Command was 1,417. The force throughout the year consisted of two companies of Artillery, namely, the 12th and 35th Companies, Southern Division, the 1st Battalion West Yorkshire Regiment, and detachments of the Royal Engineers, Army Service Corps, Medical Staff Corps, Army Ordnance Corps, Army Pay Corps and Garrison Staff.

The 1st Battalion Royal Lancaster Regiment arrived from Malta on 26th December.

The following table shows the admission, mortality and invaliding rates among these troops :—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
1,417	2,973	10	1	11	73	29	162·07	2098·1	7·76	51·51	20·47	114·38

In comparison with the ratios for the previous year the admission and constantly sick rates are higher by 241·6 and 26·81 per 1,000 respectively, and in comparison with the average ratios for the preceding ten years by 773·4 and 49·41. The mortality rate is higher than in 1896 by ·28 but lower than the average ratio by 3.55. The average sick time to each soldier was 41·75 days, which is longer than in the previous year by 9·70, and than the average period for the preceding ten years by 18·04 days. The average duration of each case of sickness was 19·90 days, which is longer in the two comparisons by 2·64 and 1·99 days respectively.

In Abstract XXVI is a table showing these health statistics for the several regiments and corps which served in China during the year. In the Royal Artillery the highest admission, mortality and constantly sick rates were 1841·5, 29·70, and 118·11 per 1,000 in No. 35 Company Southern Division. The ratios for the 1st Battalion West Yorkshire Regiment were 2417·1, 3·07, and 130·44 per 1,000 respectively, the mortality rate including that of an invalid. The ratios of admission and constantly sick in the Royal Engineers and Departmental Corps, were, as usual, comparatively low, but there were 4 deaths in the Royal Engineers, equal to a ratio of 25·00 per 1,000.

As to the influence of age on sickness and mortality, it is found that the admission rate was 2586·2 per 1,000 among men under 20 years of age, 2662·5 among men between 20 and 25 years, 1385·6 among men between 25 and 30, and 900·0 among men over 30 years of age. The corresponding ratios in the previous year were 1333·3, 1946·2, 2036·7, and 1077·3 per 1,000 respectively. Of the deaths in the Command, 1, or 34·48 per 1,000, occurred among men under 20 years of age, 3, or 3·70 per 1,000, among men between 20 and 25 years, 5, or 10·89 per 1,000, among men between 25 and 30, and 1, or 8·33 per 1,000, among men of more than 30 years of age. In the previous year there was no mortality among men under 20, and the highest ratio was that of men of over 30 years of age. *China.*

With regard to service in the Command, the admission rate for men in their first year was 2207·2 per 1,000; among men in their second year it was 2421·4; among men in their third year, 1225·3; and among men of more than 3 years' service in the Command, 1062·0. These ratios follow practically the same sequence as in the previous year. There were 4 deaths, or 4·12 per 1,000 among men in their first year, 4, or 16·52 per 1,000, among men in their second, and 2, or 11·56 per 1,000 among those in their third year. In the previous year the whole of the deaths occurred among men in their first and second years of service in the Command.

The principal statistics of sickness and mortality, arranged according to the various sections of disease, are given in Abstract No. XIII.

GENERAL DISEASES.—There was no admission for *eruptive fevers* during the year. *Enteric fever* caused one admission, which terminated fatally. No insanitary condition could be found in the barracks or their immediate surroundings to account for the attack. In 1896 there were 11 admissions and 1 death.

Under the heading of *other continued fevers*, 5 cases are returned, equal to a ratio of 3·5 per 1,000, as compared with 124·5 in the preceding year, (when there were 183 admissions) and with 19·3 the decennial average rate. It is stated that the decrease is probably due to a change in diagnosis arising from the tracing of most of the cases of fever to malarial influences. There is, however, no appreciable increase in the total admissions for malarial fevers; although in the form known as remittent, an increase, (84 as compared with 12), has occurred. In 1897 it would seem that the alteration in diagnosis made in 1896, and referred to in the Annual Report for that year, has been abandoned and the diagnosis of simple, continued, and remittent fevers has reverted to the custom of years previous to 1896.

There was one admission for *dysentery*, the ratio, ·7 per 1,000, comparing favourably with 5·4 in 1896 and 13·0 the average rate for the preceding ten years.

Malarial Fevers.—There were 840 admissions and one death, 756 being cases of ague and 84 cases of remittent fever, the death being due to the latter. The admission rate was 592·8 per 1,000, which differs only fractionally from the previous year's rate but is 113·0 above the average ratio for the ten years 1887–96. In 1896 there were only 12 cases of remittent fever, as compared with 84 in 1897. The cause of the increase is referred to above under other continued fevers.

Tubercular disease of the lung caused 4 admissions and 2 deaths, the latter including that of an invalid who had left the Command. The admission rate, 2·8 per 1000, is higher than in 1896 by ·8, but below the average rate by 2·0.

Venereal Diseases.—There were 168 admissions for *primary syphilis* or a ratio of 118·6 per 1,000, as compared with 65·3 in the previous year, and with 41·4 the average rate. If to this be added the sickness from soft chancre, for which there were 247 admissions and 18·31 men constantly sick the total admission ratio for primary venereal sores equalled 292·9 per 1,000, which is higher than in 1896 by 84·8, and than the decennial average rate by 136·3. *Secondary syphilis*, with 121 admissions, gave a ratio of 85·4 per 1,000, which is below the previous year's rate by 20·7, but above the average rate by 31·9. For *gonorrhœa* there were 411 admissions, or a ratio of 290·1 per 1,000 which is higher than in the previous year by 101·7, and than the average rate by 145·5.* Including all forms, the total admission rate for venereal diseases was 668·4 per 1,000, which is higher than in 1896 by 165·8,

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* There were no admissions for ulcer of penis.

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and than the average ratio for the preceding ten years by as much as 313·7. The total amount of constant inefficiency from these diseases was equal to [illegible] per 1,000, or [illegible] above the rate for the previous year and 29·25 above the average rate.

The Principal Medical Officer remarks that the statistics of the past two years indicate a persistent and rapid increase in venereal disease, both in the number of cases and in the rate of constant inefficiency from these causes, which, if it continues, will probably necessitate a permanent increase in the hospital establishment at Hong Kong.

Parasitic Diseases were the cause of 65 admissions, the ratio 45·9 per 1,000, being above the average rate by [illegible]. The admissions were mostly for ringworm.

Alcoholism.—There were 9 admissions with 1 death. The admission ratio was 6·4 per 1,000, which is exactly double the average rate. No case of delirium tremens is recorded.

Rheumatism caused 38 admissions, or a ratio of 26·8 per 1,000, which is below the previous year's rate by 10·6, but above the decennial average rate by 6·4. The cases included 3 of rheumatic fever.

There were 26 admissions for *debility*, the ratio 18·4 per 1,000, being lower than that for 1896 by [illegible], and than the average rate by 3·9.

Under the heading of *other general diseases* 34 admissions are returned, of which 25 were for non-malignant new growths and 9 for anaemia.

LOCAL DISEASES.—*Diseases of the Nervous System.*—There were 35 admissions and 2 deaths, including 4 cases of mental disorder with 1 death. The admission ratio, 24·7 per 1,000, is higher than in 1896 by 13·8, and than the average rate for the ten years 1887–96 by 15·6. The causes of admission were, neuralgia 18 cases, vertigo 5, melancholia 3, nervous weakness 3, epilepsy and headache 2 each, and 1 case each of multiple neuritis and mania. One of the deaths was due to multiple neuritis, and the other was that of a man suffering from melancholia, who threw himself from a verandah and sustained multiple injuries.

Diseases of the Eye caused 16 admissions, or a ratio of 11·3 per 1,000, which is below the previous year's rate by 3·0, but above the average rate by 3·3. Conjunctivitis was the principal cause of admission.

Diseases of other Organs of Special Sense contributed 113 admissions, or a ratio of 79·7 per 1,000, which is higher than that for 1896 by 48·4 and than the decennial average rate by 64·0. Nasal disease was the cause of 4 of the admissions, the remainder being due to aural affections, inflammation of the external meatus furnishing 92.

Diseases of the Circulatory System caused 25 admissions, equal to a ratio of 17·6 per 1,000, which is lower than that for the previous year by 2·8, but higher than the average rate by 3·7. The admissions were 17 for disordered action of the heart, 5 for varix, and 3 for valvular disease of the heart. No death occurred.

Diseases of the Respiratory System.—There were 51 admissions, the equivalent ratio being 36·0 per 1,000, which is higher than the previous year's rate by 14·2, and than the average rate by 9·2. The cases included 44 of bronchitic affections, 3 of pneumonia and 2 of pleurisy.

Diseases of the Digestive System were the cause of 206 admissions, the ratio, 145·4 per 1,000, being higher than that for the preceding year by 13·4 and than the average rate by 50·9. The principal causes of admission were affections of the mouth and throat, 83 cases, diarrhœa 37, dyspepsia 31, colic 19, and hepatic affections 16 cases. There was no death.

Diseases of the Lymphatic System, with 42 admissions, gave a ratio of 29·6 per 1,000, which is 3·1 below the previous year's rate, but 2·5 above the average ratio.

Diseases of the Urinary System caused 3 admissions, 2 being for incontinence of urine and 1 for Bright's disease.

Diseases of the Generative System.—There were 288 admissions, of which 247 were for soft chancre, as noted under the heading of venereal disease. Among the remainder there were 22 admissions for orchitis and 12 for balanitis. The admission ratio, 203·3 per 1,000, is higher than that for the previous year by 44·8, and than the average rate by 69·1.

China.

Diseases of the Organs of Locomotion were represented by 19 admissions, equal to a ratio of 13·4 per 1,000, which is above the previous year's and average rates by 1·8 and 4·7 respectively. Eight of the admissions were for synovitis.

Diseases of the Connective Tissue caused 75 admissions, the ratio, 52·9 per 1,000, being higher than that for 1896 by 18·2, and than the average rate by 29·0. The cases were 34 of inflammation and 41 of abscess of the connective tissue.

Diseases of the Skin were the cause of 177 admissions, the equivalent ratio being 124·9 per 1,000, which exceeds the average rate for the preceding ten years by 78·1. Boils alone caused one half of the admissions.

INJURIES.—199 admissions and 4 deaths are returned. The admission ratio, 140·4 per 1,000, is higher than in 1896 by 43·8, and than the average rate by 52·1. Under *general injuries*, 2 admissions for heat-stroke are recorded, and there were two deaths from suffocation from submersion, a verdict of "found drowned" being returned in each case. Of 197 admissions for *local injuries*, 56 were due to sprains, 55 to wounds, 49 to contusions, and 25 to abrasions. The deaths were 1 from fracture of skull, sustained by a fall from a verandah, and 1 from shock following fracture of femur and clavicle, the result of an accident at football.

INVALIDING.—The number of men invalided home was 73, the equivalent ratio being 51·51 per 1,000, which is lower than that for the previous year by 9·71, but higher than the average rate by 18·17. The invaliding rate was 85·71 per 1,000 in the Royal Artillery, 56·25 in the Royal Engineers 41·20 in the Infantry, and 96·15 per 1,000 in other corps, as compared with 74·07, 46·67, 62·87, and *nil* respectively, in 1896. Of the men invalided, 2, or 68·96 per 1,000, were under 20 years of age; 52, or 64·27 per 1,000, were between 20 and 25 years, as compared with a ratio of 67·58 in 1896; 9, or 19·60 per 1,000, were between 25 and 30, as against 54·00 in 1896; and 10 men, or 83·33 per 1,000, were upwards of 30 years of age, the corresponding ratio in the preceding year being 60·77. With regard to service in the Command, 50 men, or 51·54 per 1,000, were in their first year; 5 men, or 20·66 per 1,000, were in their second year; 16, or 92·48 per 1,000, were in their third year; and 2 men, or 62·50 per 1,000, had more than three years of service in the Command. In the previous year, the whole of the invaliding occurred among men in their first and second years in the Command. The principal causes of invaliding were malarial fevers 20 cases, aural affections 12, diseases of the circulatory system 9 (of which 3 were disordered action of heart), digestive disorders 6, nervous affections 6, tubercle of lung and debility 4 each, and secondary syphilis 3 cases. There were 29 men discharged the service as medically unfit, the ratio 20·47 per 1,000, being lower than in 1896 by 10·82, but higher than the decennial average rate by 6·19. The principal disabilities necessitating discharge were aural diseases 5 cases, diseases of the circulatory system 5 (including 2 disordered action of heart), malarial fevers 4, and secondary syphilis 4.

OFFICERS.—In an average strength of 67 there were 38 cases of sickness and 1 death, the equivalent ratios being 567·2 and 14·93 respectively, as compared with 758·1 and 16·13 in 1896. There was one fatal case of small pox, supposed to have been contracted while shopping in the Chinese quarter. Enteric fever caused 2 admissions; the origin of the disease could not be traced. Malarial fevers were represented by 6 cases of ague and 3 of remittent fever. Seven officers were invalided, one each for enteric fever, remittent fever, debility, neuralgia, hepatitis, cystitis, and boils.

WOMEN.—The average strength was 67, and the attacks of illness 103 in number, with 1 death, the corresponding ratios being 1,537·3 and 14·93 per 1,000, which are lower by 278·1 and ·45 respectively, than in the preceding year. There were 2 cases of smallpox, the disease being probably contracted in the city of Victoria; both recovered. The chief causes of admission were malarial fevers, debility, and bronchitis. The death was due to remittent fever.

hina.

CHILDREN.—The average strength was 116, and there were 212 cases of sickness and 2 deaths, equal to ratios of 1,827·6 and 17·24 per 1,000, the former being higher by 435·6 and the latter lower by 22·76 than the corresponding ratios for 1896. The admissions included 50 for bronchial affections, 40 for malarial fevers, 22 for measles, 18 for debility, and 12 for diarrhœa. The deaths were one each from convulsions and enteritis.

VACCINATION.—There were 5 primary vaccinations among the women and 33 among the children, 2 of the former and 21 of the latter being unsuccessful. Of 30 re-vaccinations among the men, 18 were failures, and of 4 among the women and 2 among the children, 2 of the former and 1 of the latter were failures. All the operations recorded were performed with preserved lymph, which is asserted to be inert during the summer months.

II. ASIATIC TROOPS

The force consisted of the Hong Kong, Asiatic Battalion, Royal Artillery, average strength 380, the Chinese section, submarine miners, Royal Engineers, average strength 48, and the Hong Kong Regiment with an average strength of 800. The total average annual strength was 1,228, and the number of admissions into hospital 1,482. There were 5 deaths, including that of one man who died at his home in India and of another who was proceeding thither. 33 men were discharged as invalids, and there were 52·71 men constantly sick. The admission rate equalled 1,206·8, the death rate 4·07, the invaliding rate 26·87, and that of constant inefficiency through sickness 42·92 per 1,000. The admission rate is higher by 31·0, but the mortality invaliding and constantly sick rates are lower by 5·06, 2·81, and 2·43 per 1,000, respectively.

Of the admissions, 389 were due to malarial fever, 2 cases being returned as remittent fever and 387 as ague. The other chief causes of admission were injuries 269 cases, venereal diseases (including soft chancre) 160, skin affections 146, diseases of the respiratory system 106, of which one half were due to asthma, and several of which are re-admissions of the same individuals, digestive disorders 90, including 41 of diarrhœa, and parasitic affections 88 cases, guinea-worm accounting for 23 of the latter, the patients being recruits who had just arrived from India, where they had contracted the disease. One of these cases had to be discharged on account of the disease causing permanent enlargement and stiffness of the joints.

With regard to the large proportion of admissions for asthma, the medical officer in charge at Kowloon observes that "asthma is a complaint to which "natives of India residing in Hong Kong are particularly prone, and once it "has commenced, it rapidly unfits the subject for military service as a soldier. "Curiously, when men affected with asthma go on leave to India, and most of "them go to the dry climate of the Punjab, they say the disease leaves them "almost at once, and never returns until they come back to Hong Kong, in "which residence of ten days to a fortnight is long enough to reduce them to "the original asthmatic condition."

The deaths in the Command were one each from ague, remittent fever, and hepatitis. In neither of the deaths of men on leave could the cause be ascertained. An officer, a native of India, died from diabetes mellitus.

SANITARY CONDITIONS.

The Principal Medical Officer (Surgeon-Colonel G. J. H. Evatt, M.D.) reports that "the general health of the troops during 1897 was indifferent, mainly owing to the excessive prevalence of venereal disease." He attributes this excess of venereal disease to the fact that the troops "are living in the midst of a very overcrowded Chinese city; the men have few outlets for recreation, as the recreation grounds are far away from the barracks."

China.

The latter are dimly lighted at night and "the better lighting and more spacious surroundings of the grog shop and brothel" are attractions, which should be neutralised by giving the men the "best recreation rooms, well lit and comfortable, and by thoroughly lighting the barrack rooms." He adds that the best remedy of all would be the "removal of the soldier to higher sites on the hillside behind Victoria." As a step in this direction, the Mount Austin Hotel has been secured by the War Department and will be converted into a barrack for half a battalion of infantry.

Amongst other general remarks, the Principal Medical Officer notes that there was no plague in the Colony during the year, but that smallpox was prevalent from time to time in the city of Victoria. He continues to recommend the addition of mutton to the rations, and also an increase in the flannel underclothing of the troops. The existing scale is considered inadequate, on account of the excessive humidity of the climate. The water supply and conservancy arrangements of the barracks generally are considered satisfactory.

The only sanitary improvements noted in connection with the barracks, are some minor improvements in the Lyemun Barracks and Head Quarter House, and the provision of shower baths generally throughout the barracks and hospitals.

The hospital accommodation in the Wellington Barracks has been increased by the addition of 19 beds, due to the evacuation of the sick of the Hong Kong R.A. to the hospital for Asiatic troops at Kowloon, which has been increased by the temporary conversion into hospital wards of G. Block of the new Whitfield Barracks. The need of a new station hospital in Hong Kong is much felt, the present arrangements being described as a "makeshift" arrangement. The condition of this hospital is briefly described in the Annual Report for 1896. In 1897 there were no typhoons, and communication with the section of the hospital on the "Meanee" was only interrupted once, and then only for a few hours. There is no note of the Sanitarium having been open during the year.

With regard to the Asiatic troops, the Principal Medical Officer deprecates the granting of money allowance in lieu of ration, and also the custom of allowing each soldier to provide his own bedstead. This latter custom, which he describes as "a survival of an old Indian custom that once applied there even to English troops," leads to a variety of bedsteads in the barrack rooms, causing much space to be unnecessarily occupied.

XII.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA.

Sickness and Mortality.

I.—European Troops.

China.

The average strength of the troops serving in the Command was 1,417. The force throughout the year consisted of two companies of Artillery, namely, the 12th and 35th Companies, Southern Division, the 1st Battalion West Yorkshire Regiment, and detachments of the Royal Engineers, Army Service Corps, Medical Staff Corps, Army Ordnance Corps, Army Pay Corps and Garrison Staff.

The 1st Battalion Royal Lancaster Regiment arrived from Malta on 26th December.

The following table shows the admission, mortality and invaliding rates among these troops :—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratio per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally Discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
1,417	2,973	10	1	11	73	29	162·07	2098·1	7·76	51·51	20·47	114·38

In comparison with the ratios for the previous year the admission and constantly sick rates are higher by 241·6 and 26·81 per 1,000 respectively, and in comparison with the average ratios for the preceding ten years by 773·4 and 49·41. The mortality rate is higher than in 1896 by ·28 but lower than the average ratio by 3.55. The average sick time to each soldier was 41·75 days, which is longer than in the previous year by 9·70, and than the average period for the preceding ten years by 18·04 days. The average duration of each case of sickness was 19·90 days, which is longer in the two comparisons by 2·64 and 1·99 days respectively.

In Abstract XXVI is a table showing these health statistics for the several regiments and corps which served in China during the year. In the Royal Artillery the highest admission, mortality and constantly sick rates were 1841·5, 29·70, and 118·11 per 1,000 in No. 35 Company Southern Division. The ratios for the 1st Battalion West Yorkshire Regiment were 2417·1, 3·07, and 130·44 per 1,000 respectively, the mortality rate including that of an invalid. The ratios of admission and constantly sick in the Royal Engineers and Departmental Corps, were, as usual, comparatively low, but there were 4 deaths in the Royal Engineers, equal to a ratio of 25·00 per 1,000.

As to the influence of age on sickness and mortality, it is found that the admission rate was 2586·2 per 1,000 among men under 20 years of age, 2662·5 among men between 20 and 25 years, 1385·6 among men between 25 and 30, and 900·0 among men over 30 years of age. The corresponding ratios in the previous year were 1333·3, 1946·2, 2036·7, and 1077·3 per 1,000 respectively. Of the deaths in the Command, 1, or 34·48 per 1,000, occurred among men under 20 years of age, 3, or 3·70 per 1,000, among men between 20 and 25 years, 5, or 10·80 per 1,000, among men between 25 and 30, and 1, or 8·33 per 1,000, among men of more than 30 years of age. In the previous year there was no mortality among men under 20, and the highest ratio was that of men of over 30 years of age. *China.*

With regard to service in the Command, the admission rate for men in their first year was 2207·2 per 1,000; among men in their second year it was 2421·4; among men in their third year, 1225·3; and among men of more than 3 years' service in the Command, 1062·0. These ratios follow practically the same sequence as in the previous year. There were 4 deaths, or 4·12 per 1,000 among men in their first year, 4, or 16·52 per 1,000, among men in their second, and 2, or 11·56 per 1,000 among those in their third year. In the previous year the whole of the deaths occurred among men in their first and second years of service in the Command.

The principal statistics of sickness and mortality, arranged according to the various sections of disease, are given in Abstract No. XIII.

GENERAL DISEASES.—There was no admission for *eruptive fevers* during the year. *Enteric fever* caused one admission, which terminated fatally. No insanitary condition could be found in the barracks or their immediate surroundings to account for the attack. In 1896 there were 11 admissions and 1 death.

Under the heading of *other continued fevers*, 5 cases are returned, equal to a ratio of 3·5 per 1,000, as compared with 124·5 in the preceding year, (when there were 183 admissions) and with 19·3 the decennial average rate. It is stated that the decrease is probably due to a change in diagnosis arising from the tracing of most of the cases of fever to malarial influences. There is, however, no appreciable increase in the total admissions for malarial fevers; although in the form known as remittent, an increase, (84 as compared with 12), has occurred. In 1897 it would seem that the alteration in diagnosis made in 1896, and referred to in the Annual Report for that year, has been abandoned and the diagnosis of simple, continued, and remittent fevers has reverted to the custom of years previous to 1896.

There was one admission for *dysentery*, the ratio, ·7 per 1,000, comparing favourably with 5·4 in 1896 and 13·0 the average rate for the preceding ten years.

Malarial Fevers.—There were 840 admissions and one death, 756 being cases of ague and 84 cases of remittent fever, the death being due to the latter. The admission rate was 592·8 per 1,000, which differs only fractionally from the previous year's rate but is 113·0 above the average ratio for the ten years 1887-96. In 1896 there were only 12 cases of remittent fever, as compared with 84 in 1897. The cause of the increase is referred to above under other continued fevers.

Tubercular disease of the lung caused 4 admissions and 2 deaths, the latter including that of an invalid who had left the Command. The admission rate, 2·8 per 1000, is higher than in 1896 by ·8, but below the average rate by 2·0.

Venereal Diseases.—There were 168 admissions for *primary syphilis* or a ratio of 118·6 per 1,000, as compared with 65·3 in the previous year, and with 41·4 the average rate. If to this be added the sickness from soft chancre, for which there were 247 admissions and 18·31 men constantly sick the total admission ratio for primary venereal sores equalled 292·9 per 1,000, which is higher than in 1896 by 84·8, and than the decennial average rate by 136·3. *Secondary syphilis*, with 121 admissions, gave a ratio of 85·4 per 1,000, which is below the previous year's rate by 20·7, but above the average rate by 31·9. For *gonorrhœa* there were 411 admissions, or a ratio of 290·1 per 1,000 which is higher than in the previous year by 101·7, and than the average rate by 145·5.* Including all forms, the total admission rate for venereal diseases was 668·4 per 1,000, which is higher than in 1896 by 165·8,

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* There were no admissions for ulcer of penis.

Straits Settlements.

The marked decrease in venereal disease is stated to have occurred chiefly at Tanglin. The type of syphilis occurring there is, however, noted as being severe.

Parasitic Diseases.—There were 15 admissions, of which 13 were for ringworm and 2 for tænia solium. The ratio, 11·1 per 1,000, is below the average by 6·6.

Alcoholism.—Under this heading there were 4 admissions, as compared with 3 in the previous year. There were no cases of delirium tremens.

Rheumatism was the cause of 37 admissions, including 1 for rheumatic fever, the ratio, 27·4 per 1,000, being higher than in 1896 by 7·4, and than the average rate for the preceding ten years by 13·6.

Debility caused 16 admissions, equal to a ratio of 11·8 per 1,000, which is greater than in the previous year by 8·1, but less than the average rate by 2·3.

Under the heading of *other general diseases*, 2 admissions are recorded, one being for non-malignant new growth and one for anæmia.

LOCAL DISEASES.—*Diseases of the Nervous System.*—6 admissions and 2 deaths are returned. The admission ratio, 4·4 per 1,000, is lower than the previous year's ratio by 9·0, and than the average rate by 3·9. The cases were 2 of neuralgia and 1 each of epilepsy, megrim, melancholia, and hæmorrhage of the membranes of the brain, the last case ending fatally. There was also a death from meningitis, which occurred in the civil prison at Singapore.

Diseases of the Eye caused 15 admissions, or a ratio of 11·1 per 1000, which is lower than in 1896 by 8·2, and than the decennial average rate by 8·0. All but one of the admissions were due to conjunctivitis.

Diseases of other Organs of Special Sense gave 21 admissions, the equivalent ratio being 15·5 per 1,000, which is an increase of 9·6 on the previous year's and of 1·1 on the average ratio. Inflammation of the external meatus caused 15 of the admissions, and there was one case of nasal affection.

Diseases of the Circulatory System were the cause of 6 admissions, equal to 4·4 per 1,000, which is 1·4 above the rate for 1896, but fractionally below the average. Four of the cases were due to disordered action, and two to valvular disease of the heart.

Diseases of the Respiratory System.—There were 19 admissions and 1 death. The admission ratio was 14·1 per 1,000, which is the same as that for the previous year, but below the average rate by 5·7. The cases included 12 of bronchitis and 4 of pleurisy, the death being due to pneumonia.

Diseases of the Digestive System.—73 admissions are returned, equal to a ratio of 54·0 per 1,000, which is above that for 1896 by 2·2, but below the decennial average rate by 15·9. Dyspepsia, diarrhœa, and hepatic affections were the chief causes of admission. No death occurred. A case of hepatic abscess at Fort Canning is noted as having been successfully treated by aspiration alone.

Diseases of the Lymphatic System caused 49 admissions, or a ratio of 36·2 per 1,000, as compared with 37·7 in 1896 and 41·0 the average rate. The cases included 41 of inflammation and 7 of suppuration of the lymphatic glands.

Diseases of the Urinary System gave 4 admissions, as compared with 3 in the previous year, and comprised 2 for nephritis and 1 each for cystitis and incontinence of urine.

Diseases of the Generative System.—There were 125 admissions, the ratio, 92·5 per 1,000, being higher than in the previous year by 45·1, but 6·0 below the average rate. Most of the admissions have been referred to under the heading of venereal diseases, and there were 20 for orchitis among the remainder.

Diseases of the Organs of Locomotion.—18 admissions are returned, the ratio, 13·3 per 1,000, being greater than in 1896 by 3·7, and than the decennial average rate by 5·6. Synovitis was the most frequent cause of admission.

Diseases of the Connective Tissue, with 44 admissions, gave a ratio of 32·5 per 1,000, which is above the previous year's and average rates by 4·4 and 2·2 respectively.

Diseases of the Skin caused 41 admissions, equal to 30·3 per 1,000, which is below the average rate by 20·2. Among the cases were 13 of ulcer, 9 of boils, and 8 of eczema.

INJURIES.—96 admissions and 3 deaths are returned. The admission ratio, 71·0 per 1,000, is lower than the previous year's rate by 13·5, and than the average rate by 25·8. Under *general injuries* one fatal case of sunstroke, which occurred in April during the manœuvres, is recorded, and there were two deaths from suffocation from submersion, one man being "found drowned" in the sea, and the other committing suicide by drowning himself in one of the swimming baths at Tanglin while suffering from fever. Of the 95 admissions for *local injury*, 31 were due to sprains, 27 to wounds, and 16 to contusions.

INVALIDING.—The number of men invalided home during the year was 15, being in the ratio of 11·09 per 1,000, which is lower than in 1896 by 3·70 and than the average rate for the preceding ten years by 7·05. Of the men invalided, 6, or 23·44 per 1,000, belonged to the Royal Artillery, and 9, or 9·28 per 1,000, to the Infantry. With regard to age, 1 man, or 55·55 per 1,000, was under 20 years of age, 7 men, or 9·94 per 1,000, were between 20 and 25, and 7 men, or 14·46 per 1,000, between 25 and 30 years. As to length of service in the Command, 12 men, or 11·72 per 1,000, were in their first year, and 3 men, or 20·13 per 1,000, were in their second year. The causes of invaliding were secondary syphilis 3 cases, debility 3, and tubercle of lung, epilepsy, mania, valvular disease of the heart, bronchial catarrh, dyspepsia, hepatitis, inflammation of lymphatics, and ostitis, one case each.

There were 16 men discharged the service as medically unfit during the year, the ratio, 11·83 per 1,000, being higher than that for the preceding year by 9·61, and than the decennial average rate by 2·56. The disabilities necessitating discharge were secondary syphilis 5 cases, rheumatism 2, and tubercle of lung, debility, neuritis, epilepsy, mania, valvular disease of heart bronchitis, inflammation of lymphatics, and ostitis, one case each.

OFFICERS.—In an average strength of 49, there were 20 cases of sickness, the ratio being 408·2 per 1,000, which is below that for the previous year by 238·9. Malarial fevers were the chief cause of sickness. No death is reported, but 4 officers were invalided, two for fracture, and one each for dysentery and debility.

WOMEN.—The average strength was 57, and there were 50 attacks of illness, but no death. The admission ratio was 877·2 per 1,000, which is 49·7 greater than in 1896. Among the cases treated were 14 for debility, 7 for ague, and 5 for anæmia.

CHILDREN.—The average strength was 118, and there were 71 cases of sickness and 1 death. The ratio of admission was 601·7, and that of mortality 8·47 per 1,000. The cases include 19 of disorders of dentition, 8 of malarial fever, 7 each of bronchitis and simple continued fever, and 6 of debility. The death was due to meningitis.

VACCINATION.—Of primary vaccinations among the children there were 11, all successful, and of 34 re-vaccinations among the men 19 were failures. Preserved lymph only was used during the year.

II.—ASIATIC TROOPS.

The force consisted of the Singapore Company, Royal Artillery, with an average strength of 108, at Blakan Mati, and the Singapore Company, Royal Engineers, with an average strength of 47, at Pulo Brani; the former are Mahommedans recruited from India, and the latter are Malays. The total number of admissions was 113, and the average number constantly sick 4·13 giving ratios per 1,000 of 729·0 and 26·64 respectively, both being above the corresponding ratios in the previous year, the former by 402·0, and the latter by 8·28. The increase in the amount of sickness is attributed to the greater prevalence of malarial fevers, for which there were 51 admissions, as compared with 6 in the previous year. This large increase is stated to be probably due to the excessive rainfall and effluvia from malarious swamps which abound in the neighbouring islands. There were 10 admissions for venereal disease and 8 for bronchitis. Four deaths occurred, two from tubercle of lung, one from pneumonia, and one from fracture of skull, the result of a blow from behind inflicted by some unknown person.

SANITARY CONDITIONS.

The Senior Medical Officer (Brigade-Surgeon-Lieut.-Colonel H. H. Stokes, M.B.) reports that the chief causes of sickness were venereal disease and malarial fevers, but the latter show a marked decrease as compared with former years. No explanation, however, is given of this decrease. The general sanitary conditions connected with clothing, rations, ablution, conservancy and water supply are considered satisfactory. The practice of filtering and then boiling the drinking water has been adopted throughout the Command. Australian frozen beef was supplied twice weekly till the end of the year, when it it was abandoned as it could note b procured at the contract rates. This supply was considered much better than the local supply.

At *Fort Canning* the wash-house of the garrison cells was reconstructed and a new cook-house erected. The canteen urinal was also reconstructed. All the bungalows except one married block had the roofs renewed during the year. The swimming bath was disused, the water supply being dirty and the bath itself without protection from the sun. The cemented baths and tubs in the ablution rooms were considered sufficient to meet all requirements. The medical officer in charge of the Station Hospital, Fort Canning, states that the urinals and latrines are badly situated and too near the hospital; and that the want of a hospital for women and children and a ward for officers is much felt. He also notes that the surface drainage of the low-lying ground is defective, and that this portion of the fort becomes a swamp in rainy weather. Cholera, enteric fever, and smallpox were prevalent amongst the civil population, and were attributed to importation by coolies from neighbouring States.

On the island of *Blakan Mati* a new officers' mess and quarters, two new blocks of married quarters, a sergeants' mess, and four new barrack blocks for European troops were occupied during the year. The barracks are similar to those described in the Report for 1896 as being opened at Pulo Brani. The new Station Hospital for both Asiatic and European troops was also practically completed at the close of the year, but had not been handed over for occupation. The drinking water is obtained from a large tank or well, and is chiefly rain water. It is drawn and distributed by coolie labour under supervision, and is noted as being kept free from pollution. The surface drainage of the new buildings is considered defective, as it discharges into a ditch close to the barracks. It is said to require prolongation if insanitary conditions are to be avoided. In 1897 it is noted that there is a village of about 100 natives in the centre of the island. In 1896 no civil habitations were reported to exist.

At *Pulo Brani* no alterations are reported in the sanitation, &c., of the island. The surface drainage of the new barracks requires prolongation as at Blakan Mati.

At *Penang* all the sanitary conditions were considered satisfactory. The station was on the point of being evacuated by the garrison at the close of the year, and no sanitary improvements have been noted.

At *Tanglin* the new married quarters were completed but not handed over for occupation. The new sergeants' mess was also approaching completion. The improvements in the hospital were continued, the urinals and latrines being reconstructed. This hospital is stated to have been overcrowded, but the ventilation is noted as being very free. During the year a considerable extent of concrete surface drains was constructed. The municipal water supply is being laid on to barracks, the present supply from shallow wells being considered liable to pollution.

Straits Settlements.

The general sanitary condition and health of the Asiatic troops were good. The hospital accommodation for them is insufficient, but this will be remedied when the new Blakan Mati hospital is handed over. The troops receive a money allowance in lieu of rations, but no comment is made on the effect of this on their general health.

XIV.—ON THE HEALTH OF THE EUROPEAN TROOPS SERVING IN INDIA.

SICKNESS AND MORTALITY.

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The average strength of European troops serving in India during the year, excluding those employed in the North Western Frontier Expeditions, the statistics of which are not included in this report, was 64,531 warrant officers, non-commissioned officers and men, as compared with an average strength of 70,484 in 1896.

In the following table are shown the admission, mortality, invaliding rates, &c., among the troops during the year:—

1897. Average Strength.	Admissions.	Deaths.			Invalids.		Average constantly Sick.	Ratios per 1,000 of Strength.				
		In the Command.	Of Invalids.	Total.	Sent Home.	Finally discharged.		Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.
64,531	96,824	1,214	28	1,242	2,258	1,301	6541·90	1500·4	19·25	34·93	20·16	101·38

Compared with the corresponding ratios in the preceding year an increase is observed in the admission, death and constantly sick rates of 113·7, 3·96 and 7·53 per 1,000 respectively. Compared with similar average ratios for the preceding ten years there is also an increase in the three rates of 56·5, 3·75, and 16·51 respectively.

The average sick time to each soldier was 37·00, and the average duration of each case of sickness 24·66 days. Compared with the previous year the average sick time was longer by 2·65 days and the average duration of each case less by ·11 of a day, while in comparison with similar averages for the preceding ten years there is an increase of 6·02 days in the former, and of 3·21 days in the latter.

The loss to India by deaths and invaliding to England, was 3,472 warrant officers, non-commissioned officers and men, being in the rate of 53·80 per 1,000, an increase of 11·07 on the rate in the previous year, and the loss to the army by death and final discharge as medically unfit for further service, among the troops in India, was 2,543, or 39·41 per 1,000, an increase of 11·64 on the corresponding rate for 1896.

In Abstract XVI is a table taken from the report of the Principal Medical Officer showing the prevalence of sickness and mortality in the different military districts, from which it will be seen that the highest admission rate, namely 2314·4 per 1,000, occurred in the Deesa district, being followed by 2150·7 and 2080·1 in the Narbudda and Bundelkhand districts respectively, the two last-mentioned districts being higher by 201·6 and 395·8 respectively, while the first-named district was lower by 144·2 than in 1896, in which year the highest ratios occurred in the Deesa, Sind, and Narbudda districts in the order named. The ratio in the Sind district, 1973·5, is the fourth highest and shows a decline of 5·6, as compared with that for the preceding year. The prevailing diseases in the Deesa, Narbudda, and Bundelkhand districts were malarial fevers and venereal affections which caused more than half of the admissions. The lowest admission rate was 1003·7 in the Southern district (327·0 less than in the preceding year), the next lowest being 1149·1 and 1239·0 in the Quetta and Rawal Pindi districts respectively, being a decline of 175·3 in the former but an increase of 107·5 in the latter district. In 1896 the two lowest ratios were in the

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Bangalore and Nagpur districts, which were lower by 189·8 and 654·2 respectively than in the year under report, the Rawal Pindi district giving the third lowest ratio 1131·5. Among districts other than those referred to above which show an increase of admission rate, Peshawar stands highest, the ratio of admission being greater by 423·5 than in the previous year. In the Lahore and Allahabad districts an increase of 309·1 and 231·7 respectively is observed. The Sirhind, Bombay, and Rangoon districts show a decrease of 125·0, 115·9, and 61 0 respectively. The highest rate of mortality was in the Peshawar district, 45·92 per 1,000, the next highest being 45·75 in the Bundelkhand and 33·74 in the Deesa district. These high ratios were due principally to enteric fever in the first, to enteric fever and cholera in the second, and to enteric fever, diseases of the digestive system and injuries in the last-named district. In the preceding year the Deesa district gave the highest mortality rate and was followed by the Allahabad and Narbudda districts. Compared with the mortality ratios for 1896 an increase is observed in 19 districts varying from 28·98 and 23·53 per 1,000 in the Peshawar and Bundelkhand districts to ·34 in the Lahore district. The districts showing the greatest decrease in mortality were Narbudda, Poona, Allahabad, and Quetta, the ratios being lower than in 1896 by 8·22, 7·29, 4·46, and 4·29 respectively.

In Abstract XVII will be found the statistics of sickness and mortality at the various stations. Taking first the stations in the plains having an average strength of over 150 men, it is found that Ahmedabad, as in the previous year, gave the highest admission rate, 2979·2 per 1,000, but this is lower than the corresponding rate in the preceding year by 438·2, though higher than the average rate for the previous ten years by 590·6. Of this high admission rate over one-third was due to malarial fevers and another third to venereal diseases. Nowgong comes next with 2942·3, which is higher than the previous year's rate by 642·9, and than the average by 872·7. Malarial fevers and venereal diseases furnished more than two-thirds of the number of cases at this station. The third highest ratio, 2912·6, occurred in Barrackpore, and is higher than the previous year's rate by 915·4, and than the decennial average rate by 914·7, the principal causes of the increase being malarial fevers, which furnished more than half the number of cases. The next highest ratio was 2564·3 at Neemuch, 108·6 higher than in 1896, and 792·0 higher than the average rate of the previous ten years. The lowest ratio for admission was 1035·0 per 1,000 at Dum Dum, as compared with 955·1 and 1582·7, the ratios for the preceding year and decennial average respectively. Roorkee comes next with 1036·9, which is lower than in the previous year and ten years' average by 130·2 and 260·2 respectively. The next lowest ratio is 1107·7 at Sialkot which is higher than in 1896 by 193·7 but below the decennial average by 376·3. Campbellpore, which stood lowest in 1896 with 913·2, has in the year under report an admission ratio of 1487·3 which is lower than the decennial average by 88·5. The increase in 1897 as compared with 1896 is due to malarial and enteric fevers. In 48 of the 64 plain stations in the whole Indian Command the admission rates were higher than in 1896, the most notable increases being, in addition to those already mentioned, an increase of 713·1 at Kamptee, of 640·1 at Jubbulpore, and of 625·3 at Muttra. These increases are due principally to malarial fevers and venereal diseases. In 16 stations the rates decreased, instances of considerable diminution being decreases of 1079·7 at Bhamo, 414·4 at Deolali and 314·8 at Saugor. Compared with the average ratios, the admission rates were higher in 35 stations, notably, in addition to those already mentioned, at Jubbulpore, where an increase of 739·6 is observed, and at Deesa and Fort Allahabad, where the increase amounted to 646·3 and 507·9 respectively. Decrease, as compared with average ratios, occurred in 29 stations, the principal decreases being 1087·2 at Bhamo, 822·3 at Fort Attock, and 747·9 at Mian Mir. The mortality rate in individual stations was highest at Sitapur, 115·48 per 1,000, the ratio of the station in 1896 being 12·02 and its average rate 11·50; 40 of the 47 deaths there were due to cholera and 5 to enteric fever. The next highest mortality rate was at Agra, namely, 57·90 per 1,000. This ratio is higher than in the previous year by 37·53 and than the decennial rate by 39·88; 49 out of the 63 deaths were due to enteric fever. The third highest rate was 57·23 at Barrackpore, also higher than the previous year's rate and the

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average of the preceding ten years by 32·09 and 37·32 respectively. Out of the 19 deaths 9 were due to dysentery and 6 to abscess of liver. There was also a remarkably high death rate at Peshawar, namely, 46·24, which is higher in the two comparisons by 27·96 and 21·40 respectively. Of the the 91 deaths there, 53 were due to enteric fever and 10 to dysentery. The lowest ratio of mortality was 2·64 per 1,000 at Roorkee, which is as much as 14·82 and 15·93 respectively below that of 1896 and the decennial average rate. The next lowest death rates were 5·75 at Multan, as compared with 14·27 and 13·17 in the two comparisons, 6·45 at Malapuram, a decrease of 47·60 and 10·42 in the two comparisons, and 6·55 at Aden. Of the 64 plain stations 41 had mortality ratios exceeding those of the previous year. The chief increases being, in addition to those already mentioned, at Fort Attock with a ratio of 25·81 against *nil* in 1896 and 25·48 the average of the preceding ten years; at St. Thomas' Mount with 31·55, an increase of 22·20 and 19·24, as compared with the previous year's rate and the decennial average respectively; and at Muttra, where the rate was 31·48 per 1,000, which is higher in the two comparisons by 18·80 and 16·96 respectively. The most notable instances of decrease in mortality were in Ahmedabad, where the rate was 25·00 as compared with 47·83 and 23·79 the previous years, and the decennial average ratios, in Kirkee with 15·07 as against 34·20 and 11·45, and in Allahabad, where the rate was less than in the previous year by 14·66 but above the average by ·55. At Fyzabad the rate was 10·99 below the preceding year, although only ·61 less than the decennial average.

Among the twelve sanitaria it is found that Kasauli gave the highest admission ratio, 1668·6 per 1,000, which is 160·6 higher than the corresponding rate in the previous year and 289·0 above the decennial average rate. The next highest ratio was at Pachmarhi, 1494·0, as compared with 2265·5 in 1896 and 1673·9 the average rate. Mount Abu came third with 1493·2 which is higher than in the previous year by 48·8, but lower than the average of the preceding ten years by 501·3. At Taragarh, Landour, Dalhousie, Khandalla, and Murree, the admission rates, though above those for 1896 by 274·1, 369·9, 303·4, 84·1 and 444·3 respectively, were below the average decennial rates by 246·4, 52·1, 215·4, 117·7 and 603·5 respectively. The remaining four sanitaria compare favourably with the rates for the preceding year and with the average rates, as follows:—Purandhur, 1137·3, lower by 32·2 and 365·1; Naini Tal, 1130·1, lower by 25·5 and 353·7; Wellington, 951·1, lower by 435·0 and 228·5 and Darjeeling, 898·4, lower by 78·7 and 202·0, respectively. The mortality ratio was highest at Murree, 68·18 per 1,000, being 31·14 higher than in the preceding year and 24·77 above the decennial average. The deaths, however, forming this ratio were only six in number and were from different causes. The next highest ratio, 54·79 (representing 4 deaths only) occurred at Mount Abu where the rate in 1896 was 27·78, the average rate being 12·31. Naini Tal came third with 48·78 (6 deaths) which is higher than in the previous year by 19·15 and above the average of the preceding ten years by 25·58. At Kasauli, Landour and Wellington, the death rates, 29·07, 24·39 and 8·81 respectively, were higher in the two comparisons by 15·70 and 13·23, 18·29 and 2·07, and 6·90 and 2·25. At Darjeeling the mortality rate, though above that for the preceding year by ·73, was below the average rate by ·93. Dalhousie had the lowest death ratio, 5·02, which is a decrease of 7·06 and 9·85 in the two comparisons. As in preceding years, Pachmarhi, Dalhousie, Wellington and Darjeeling were also garrisoned by healthy men. There were no deaths at Pachmarhi, Taragarh, Purandhar or Khandalla.

Of the principal hill stations garrisoned by healthy troops and having an average strength of over 150 men, Chakrata gave the highest admission ratio 1729·0 per 1,000, which is above the previous year's and the average rates by 350·0 and 470·2 respectively. The cause of this excess was chiefly venereal affections, though enteric, rheumatic, and scarlet fevers and tonsillitis also contributed largely to the high sick rate. The next highest rate was at Cherat, namely, 1595·3, which is higher in the two comparisons by 1209·1 and 527·8, the increase being due to malarial and enteric fevers and venereal diseases. Ranikhet, which was also third highest with 1502·9 in 1896, shows the third highest admission rate amongst hill stations, namely, 1548·9, or 46·0 and 273·2 per 1,000 higher than the preceding year's and the decennial average rate. The lowest rate occurred at Bernardmyo, 733·3 per 1,000, as against 686·5 in 1896, and 1104·9, the average rate, the next lowest being 817·5 at Kuldana, which is lower than the rate of the previous year and the average rate by 298·2 and 322·6 respectively. The highest mortality rate was 78·33 at Cherat, which is above the previous year's rate and the decennial average rate by 64·84 and 60·61 respectively; 21 of the 30 deaths were due to enteric fever. Jutogh came next with 22·52 against 17·02 and 11·75 in the two comparisons, 3 of the 5 deaths being due to enteric fever. Dagshai comes third highest with 14·34, as compared with 17·83 in the previous year and 12·66, the ten years' average. At Subathu, Ranikhet and Quetta, the rates were 14·12, 11·15 and 10·40 respectively, being lower than the rates of the preceding year and the decennial average by 28·29 and 2·43, 5·20 and 2·47, and 4·29 and 2·36 respectively. At no other hill station did the mortality ratio amount to 10·0 per 1,000. No death occurred at Thobba and of other stations the lowest ratio was 3·48 per 1,000 at Gharial.

In Abstract XXVII will be found the general health statistics of the different arms of the service, as well as of the individual corps which served in India during the year.

The average strength of the cavalry was 5,122, and there were 7,625 admissions with 126 deaths, the average number of men constantly inefficient amounting to 500·78. The ratio of admission was 1488·7, that of mortality 24·60, and that of constantly sick 97·77 per 1,000 of strength. Compared with corresponding figures for 1896, the admission, death and constantly sick rates have increased by 263·0, 10·53 and 15·02 respectively. The average sick time to each soldier, 35·69 days, is longer than in the previous year by 5·40 days, and the average duration of each case of sickness, 23·97, is shorter by ·74 of a day.

In the artillery, with an average strength of 11,860, there were 17,397 admissions with 244 deaths, and 1126·08 men were constantly sick, giving ratios of 1466·9, 20·57 and 94·95 in each instance. Compared with the ratios for the previous year, there is an increase in the admission, death and constantly sick rates of 122·2, 5·11 and 8·45 respectively. The average sick time for each soldier was 34·66 days, 3·00 days more than in 1896, and the average duration of each case of sickness, 23·63 days, only ·09 of a day more than in the year preceding.

The infantry had an average strength of 43,715, with 67,440 admissions into hospital, 818 deaths, and 4555·56 men constantly sick, or ratios of 1542·7 per 1,000 for admissions, 18·71 for mortality, and 104·21 for constantly sick, which are higher than in 1896 by 105·3, 3·26 and 7·41 respectively. The average sick time to each soldier was 38·04, and the average duration of each case of sickness 24·66 days, which are longer than in the year preceding by 2·61 days and ·01 of a day respectively.

The following table shows as far as possible the statistics of sickness, mortality and invaliding among the troops according to age:—

Ages.	Average Strength.	Admissions.	Deaths.	Invaliding.	Ratios per 1,000 of Strength.		
					Admissions.	Deaths.	Invaliding.
Under 20 years ..	2,029	2,458	20	31	1211·4	9·86	15·23
From 20 to 25 years ..	33,191	60,829	759	1,397	1832·7	22·87	42·09
„ 25 „ 30 „ ..	22,027	29,562	337	672	1342·1	15·30	30·51
„ 30 „ 35 „ ..	4,419	2,909	65	97	658·3	14·71	21·95
„ 35 „ 40 „ ..	1,356	823	22	38	606·9	16·22	28·02
„ 40 and upwards	408	213	11	23	522·1	26·96	56·37
Not stated	1,101	30	—	—	27·2	—	—
Total ..	64,531	96,824	1,214	2,258	1500·4	18·81	34·99

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lived in the Sadr bazar. He was attacked by the disease on the 29th September. The case at Purandhur occurred amongst the convalescents. The convalescent attacked arrived from Kamptee in February, and probably contracted the disease on the journey.

Influenza.—There were 272 admissions for this disease and 1 death (as against 808 admissions and 8 deaths in 1896), being in the ratio of 4·2 and ·02 per 1,000, which are lower respectively by 7·3 and ·09 than the preceding year's rate, and by 3·3 and ·01 than the ten years' average. The average number of men constantly sick was 9·83, giving a ratio of ·15, which is ·72 lower than that of the previous year and ·12 less than the decennial average. The highest admission rate occurred in the Oudh district, 32·0 per 1,000, the second highest being 29·0 in the Rangoon district. In the previous year the highest ratios of admission for influenza were in the Rangoon, Oudh, and Southern Districts. At Lucknow there were 148 admissions. The disease occurred as in the previous year, in an epidemic form during the months of October and November, but it was generally less severe. At Rangoon there were 62 cases, the majority being of a mild type, and they occurred as an epidemic which commenced in January, reached its maximum about the end of February, and lasted till the end of March.

Diphtheria.—There were 5 admissions and 1 death. The fatal case occurred at Lucknow and there was 1 admission each at Chakrata, Mian Mir, Rawal Pindi and Wellington. In the year preceding there was only 1 case of diphtheria.

Enteric fever.—This disease caused 2,050 admissions, 556 deaths, and a constant sickness of 296·85 men, being in the ratios of 31·8, 8·62 and 4·60 per 1,000 respectively. Compared with similar ratios for the preceding year the three rates show an increase of 6·3, 2·31 and ·91 respectively; and in comparison with the average rates for the previous ten years, increase is also observed, equal to 11·8 in the case of admissions, 3·33 in that of mortality, and 1·76 in the rate of constant inefficiency. The percentage of mortality to attack was 27·1, which is 2·3 greater than in 1896, and ·6 higher than the average for the previous ten years. In Abstract XVIII the occurrence of enteric fever at each station and in each quarter of the year is shown. The second quarter had the largest number of attacks and deaths, the third, fourth and first quarters following in the order named. The percentage of mortality to attack was highest in the fourth quarter, 28·3, followed by 28·2, 26·7 and 24·5 respectively, in the third, second and first quarters. In the preceding year mortality was highest in the second quarter, followed by the first, third and fourth.

The disease occurred in every district except Aden, and in all but seventeen stations, namely, Fort William, Fort Fulta, Kuldana, Kalabagh, Ghora Daka, Ramandroog, Thayetmyo, Meiktila, Bhamo, Bernardmyo, Satara, Purandhur, Taragarh, Khandalla, Mount Abu, Aden and Sitabaldi. The highest ratio of admission was 107·8 per 1,000 in the Bundelkhand district, which stood seventh in 1896 with a ratio of 33·1. The next highest ratio was 73·1 in Sirhind, (which stood third the year previous), being an increase of 19·6. The Peshawar district, which stood fourth in 1896, comes next with 62·7, an increase of 25·0; followed by Meerut (which was fourteenth in the preceding year) with 42·4, an increase of 22·7. The lowest ratio, 1·6 per 1,000, is shown in the Mandalay district, which was fourth lowest in 1896 with 6·2, and the next lowest in the Sind district, namely, 6·8, or 3·3 less than in the previous year. In addition to the districts above mentioned, the admission ratios were higher than in the preceding year in eleven districts, namely, Deesa, Rawal Pindi, Bangalore, Oudh, Narbudda, Madras, Southern, Belgaum, Secunderabad, Rangoon and Mhow. In the three first named the increase was 21·1, 17·6 and 16·1 respectively, but in the other districts the increase was less than 10. The ratio in the Poona district, 22·9 per 1,000, was identical with that for 1896, and in addition to the Sind district, noted above, the others had lower admission ratios, the largest decreases, 38·0, 23·7 and 21·4, being observed in the Quetta, Allahabad and Rohilkhand districts respectively. In 1896 Allahabad had the highest and Quetta the second highest admission ratios. The highest rate of mortality is observed in the Bunkelkhand district, 29·48 per 1,000, as

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compared with 9·22 in the preceding year, the next highest rate, 27·34, being in the Peshawar district, which stood fifth with 9·33 in 1896, and the third highest in the Mhow district with 15·71, an increase of 6·75. The lowest mortality rate was in the Presidency district, ·36 per 1,000, a decrease of 2·99, and the next lowest, 1·46 in the Bombay district, a decrease of 1·78. Among other districts having a higher mortality rate than in the preceding year, high increases are shown at Deesa, 10·61, Meerut, 7·01, Sirhind, 3·77, and Rawal Pindi, 3·46. The remaining increases were less than 3·0 per 1,000. The largest decrease in death rate, 6·35, is observed in the Southern district, which was second highest in 1896. The Allahabad district, which had the highest death ratio in 1896, and Quetta, which stood fourth, show decreases of 5·62 and 4·73 respectively.

The following tables have been prepared from the returns furnished by the medical officers in charge of the various hospitals, and show, as far as possible, the influence of age and service in India on the incidence of the disease.

Ages.	Average Strength.	Admissions.	Deaths.	Ratios per 1,000 of Strength.	
				Admissions.	Deaths.
Under 20 years	1,968	65	12	33·0	6·10
From 20 to 25 years ..	32,589	1,446	412	44·4	12·64
„ 25 „ 30 „ ..	21,633	425	115	19·6	5·32
„ 30 „ 35 „ ..	4,326	33	10	7·6	2·31
„ 35 „ 40 „ ..	1,321	4	2	3·0	1·51
„ 40 and upwards ..	400	—	—	—	—
Not stated*	2,294	77	5	33·6	2·18
Total ..	64,531	2,050	556	31·8	8·62

* Includes the following admissions and deaths :—Fort Chingrikhal, (1 admission, no death), Lucknow Military Prison, (2 admissions, no death), Amritsar, (13 admissions and 2 deaths), and Troops on the march (61 admissions and 3 deaths).

Length of Service in India.	Average Strength.	Admissions.	Deaths.	Ratios per 1,000 of Strength.	
				Admissions.	Deaths.
Under 1 year	11,459	817	204	71·3	17·80
1 to 2 years	11,366	457	131	40·2	11·52
2 „ 3 „	11,122	263	78	23·6	7·01
3 „ 4 „	9,890	192	58	19·4	5·86
4 „ 5 „	7,888	148	51	18·8	6·46
5 „ 10 „	8,727	93	28	10·6	3·21
10 years and upwards ..	1,775	3	1	1·7	·56
Not stated*	2,304	77	5	33·4	2·17
Total ..	64,531	2,050	556	31·8	8·62

* See note to previous table.

The station at which the greatest number of cases occurred was Agra, where there were 181 admissions (excluding a case transferred to hospital on arrival of the regiment) with 49 deaths (including the death of the man *dia.*

transferred, and a death amongst cases remaining from the previous year), as compared with 50 and 14 in 1896. The Principal Medical Officer remarks that such an outbreak has not occurred at any station in India during the last ten years. It is attributed partly to the fact that the 2nd Battalion York and Lancaster Regiment, which was chiefly affected, was new to the country, having arrived from Mauritius and South Africa on the 21st and 23rd February, on which dates an officer and some men showed symptoms of the disease. The outbreak increased in violence, specially among a draft of 200 men, who reached Agra a few days after the battalion. It is also, as in 1896, partly attributed to the municipal water supply, which was found to be infected with the enteric microbe. No article of food was found so infected. The outbreak, as stated above, commenced on the 23rd February when the first case was admitted into hospital. In March there were 2 cases, in April 59 men were admitted, in May there were 23 admissions, and the disease nearly died out in June, during which month there were only 2 cases. It recommenced towards the end of July, when there were 3 admissions, August following with 25 cases, September with 47, and October with 13. In November the admissions declined to 4 and in December to 3. The disease was not confined to any particular corps or barracks, as will be seen from the following table :—

Corps	Admissions.	Deaths.
Royal Artillery.		
In the Fort	7	2
,, No. 1 Barrack	4	1
,, ,, 3 ,, ...	4	1
,, ,, 4 ,, ...	3	—
Infantry.		
In the Fort	18	4
,, No. 1 Barrack	18	4
,, ,, 2 ,, ...	22	7
,, ,, 3 ,, ...	21	8
,, ,, 4 ,, ...	10	1
,, ,, 5 ,, ...	20	5
,, ,, 6 ,, ...	6	2
,, ,, 7 ,, ...	18	4
,, ,, 8 ,, ...	2	1
,, ,, 11 ,, ...	18	6
,, ,, 12 ,, ...	9	1
Army Schoolmasters' quarters	1	—
Total	181	47*

* Exclusive of one man transferred and one remaining from previous year.

The medical officer in charge states that every precaution possible was taken and the drinking water (which was obtained from the municipal waterworks up to the 1st December, since which date well water has been used), was boiled and treated with permanganate of potash and hydrochloric acid throughout the year. He attributes the contamination of the municipal water supply in the spring outbreak to the lowness of the river Jumna (the source of the supply), and to the resulting concentration of all the impurities that find their way into the water, and in the autumn outbreak, to the rising river sweeping down the accumulation of filth deposited on the banks and islands in the bed of the river which was used for growing melons and manured with human ordure.

Another severe outbreak occurred at Umballa, where there were 138 admissions and 33 deaths (including that of a man admitted in (1896 as

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compared with 49 admissions and 14 deaths during the previous year. By months the admissions and deaths were :—

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Admissions	9	1	7	10	17	2	1	13	6	3	12	57	138
Deaths	2	—	3	2	6	1	—	1	4	3	1	10	33

The outbreak in April and May chiefly affected the 16th Lancers, the cases being very evenly distributed over the different barrack rooms. In November and December, the 1st North Staffordshire Regiment, which arrived from Egypt on the 22nd October, was the unit chiefly affected. It had 49 out of the 69 cases during those months. On arrival at Umballa this battalion remained in the rest camp till 9th November, when it went into permanent camp near the grass farm. On the 9th December the regiment was moved to a site near the infantry barracks. The medical officer in charge attributes the outbreak in the 16th Lancers to a variety of causes, including ærated waters and flies. The outbreak in the 1st North Staffordshire Regiment he attributes to the fact that water was drawn from a well in the grass farm, which was sunk near some old filth pits. On the matter being brought to notice the water skins were withdrawn from use and the site of the camp changed to a greater distance from the farm. This action, after allowing for the ordinary incubation period, was followed by a sudden cessation of the disease.

At Lucknow there were 120 admissions with 30 deaths (including 2 among cases remaining from the previous year) as compared with 57 and 21 in 1896, and 128 and 35, the largest number at any station, in 1895. By months the admissions were :—January, 7 ; February, 3 ; March, 9 ; April, 10 ; May, 22 ; June, 1 ; July, 2 ; August, 1 ; September, 2 ; October, 7 : November, 23 ; and December, 33.

By Corps :—

18th Hussars	34
5th Dragoon Guards	1
" B " Battery R.H.A.	6
30th Field Battery R.A.	6
70th " " "	4
1st Duke of Cornwall's Light Infantry	20
2nd Essex Regiment	20
2nd East Lancashire Regiment	25
2nd Royal Sussex Regiment	2
1st Royal West Surrey Regiment	1
2nd Scottish Rifles	1

From the above it will be seen that the disease in Lucknow has been very widespread and not confined to any particular corps, and that the disease has had, as in former years, two periods of maximum prevalence, April to May and November to December. The medical officer in charge states that the special prevalence of enteric fever in an epidemic form during the two last months of the year was undoubtedly due to the presence of a large number of susceptible individuals in the 2nd Battalion East Lancashire Regiment, which arrived in India from England on the 8th October, and to the presence of young soldiers in large drafts for other corps. In January the Government analyst reported the presence of enteric microbes in 3 samples of filtered water from the Lucknow Municipal Waterworks ; in March, in one out of four samples taken from different stand-posts in cantonments, and in December, in two out of six samples taken from different hydrants in cantonments. In April, October and November, 2, 6 and 4 samples of water from the same sources were reported free from the enteric microbe. With reference to these bacteriological examinations and their results, the medical

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officer in charge makes the following observations :—" As far as I know "these were the only occasions on which any bacteriological examination of "the water was made and the negative results appear to me of little value "when compared with the actual proof of the presence of the enteric microbe "on three separate occasions at an interval of several months. I think the "argument is in favour of the microbe having been present more or less "throughout the year, and that a more extended research would have "revealed its presence generally in the cantonment water supply. . . . " Since May, orders have been in existence for the boiling of all water drunk " in barracks but it appears practically impossible to close all the avenues of " infection through the water supply. The enteric microbe has since been " discovered in water supposed to have been boiled in barracks."

Meerut had 97 admissions (excluding a case transferred) with 38 deaths, (including 3 amongst cases remaining from the preceding year) as compared with 67 admissions with 15 deaths in 1896. The admissions were in January, 5 ; February, 2 ; March, 14 ; April, 20 ; May, 15 ; June, *nil* ; July, 5 ; August, 10 ; September, 13 ; October, 5 ; November, 6 ; and December, 2. The medical officer states that no special cause or causes could be assigned for the disease. The drinking water was submitted to bacteriological analysis on three separate occasions, and in one instance the enteric bacillus was detected. This was in the water of a well in the lines of the Royal Horse Artillery, and prompt steps were taken to have the well closed and thoroughly cleansed. He adds, " My own impression is that the source of "the disease is to be found in the Regimental and Sadr bazars. All drink-"ing water in barracks is carefully boiled and treated with permanganate of "potash, but up to the present this does not seem to have had much result "in diminishing the number of attacks. Enteric fever seems now to be "quite endemic in Meerut."

At Secunderabad the admissions numbered 95 and the deaths 23 as against 96 and 18 respectively in the previous year. The monthly admissions by corps were :—

Corps.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1 Cavalry Regiment	2	—	—	—	—	—	2	2	6	3	—	—	15
1 Battery, R.H.A.	—	—	—	1	—	—	—		—	1	—	—	2
3 Field Batteries, R.A.	3	1	—	—	—	—	—		2	2	—	1	9
1 Garrison Company, R.A. ...	1	1	—	—	—	—	—		—	1	1	—	4
1st Cheshire Regiment	4	5	1	2	—	—	—	3	5	14	5	—	39
1st Northampton Regiment ..	6	4	5	1	—	—	4	3	—	2	1	—	26
Total	16	11	6	4	—	—	6	8	13	23	7	1	95

The admissions were evenly distributed throughout the station, and, as usual, occurred chiefly among young men recently arrived in the country ; 61 out of the 95 were men between 20 and 25 years of age. The largest number of admissions was in January and February and in September and October. The medical officer states that the cause of the disease, in the absence of bacteriological examination, could not be traced, but some of the cases were doubtless contracted in the bazars. Throughout the year the drinking water had been boiled, pinked with permanganate of potash and stored for use in the old Macnamara filter cases, which were kept locked.

At Rawal Pindi, 95 men were admitted and 23 died (including 1 admitted during the preceding year) as compared with 36 and 15 in 1896. The admissions and deaths were :—

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Admissions	2	1	3	7	11	10	19	9	8	9	4	12	95
Deaths	1	—	—	—	3	3	3	3	4	3	1	2	23

The medical officer remarks that the disease is endemic at Rawal Pindi, with seasonal outbreaks of greater virulence in the pre- and post-monsoon period. Regarding the etiology of the disease he states that "it can scarcely "be believed that the troops contract enteric fever in barracks, as they there "live under the most careful sanitary supervision and surroundings; the "water supply is pure and abundant; little milk is used and the quantity "consumed is boiled, and other food supplies are of good quality." He considers that the most probable source of infection is the kitchen, but he also remarks that there is no manner of doubt that it is in the insanitary brothels and drink shops of the Sadr and Regimental bazars that the disease is most frequently contracted. It is a noteworthy fact that only 2 cases of enteric fever occurred among the officers and none among the women.

At Peshawar, there were 87 admissions (excluding 20 cases transferred from Jamrud and Hari Singh-ka-Burj) and 53 deaths (including 1 amongst cases remaining from the previous year), as compared with 72 and 17 in 1896. The medical officer is unable to offer any definite opinion regarding causation but considers that previous failure of health, *e.g.*, from malarial fever, may play a part in the causation of the disease. The following table shows the admissions and deaths in each month and in each arm of the service:—

Corps.	By months.												Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Cavalry—													
Admissions	—	—	—	—	—	—	—	—	1	2	5	6	14
Deaths	—	—	—	—	—	—	—	—	—	5	11	4	20
Royal Artillery—													
Admissions	—	—	1	—	—	2	1	—	1	—	5	2	12
Deaths	—	—	—	—	—	—	2	—	—	—	4	3	9
Infantry—													
Admissions	3	5	11	3	1	3	7	2	2	9	6	9	61
Deaths	1	—	3	4	—	2	3	1	—	1	6	3	24
Total—													
Admissions	3	5	12	3	1	5	8	2	4	11	16	17	87
Deaths	1	—	3	4	—	2	5	1	—	6	21	10	53

At Mhow there were 81 cases and 28 deaths as compared with 70 and 9 in the previous year. The following table shows the admissions by corps and months:—

Corps.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	
													Admissions.	Deaths.
20th Hussars	2	1	1	7	3	1	7	11	1	2	—	3	39	13
Royal Horse Artillery	2	—	1	1	3	—	1	1	—	—	—	1	10	4
22nd Field Battery, R.A.... ...	1	—	—	—	—	—	1	1	1	—	—	—	4	1
1st Battalion Royal Fusiliers ...	—	1	2	9	2	1	5	5	—	—	—	1	26	10
Details	—	—	—	1	1	—	—	—	—	—	—	—	2	—
Total	5	2	4	18	9	2	14	18	2	2	—	5	81	28

As in 1896 the largest number occurred in April, July and August. The district Principal Medical Officer considers that the prevalence of the disease was due to the water supply from the Baircha lake. This supply has not been improved since the preceding year, and similar conditions as regards enteric prevalence were anticipated, viz., a disappearance of the disease in May and its reappearance in July with a decline in September. The water supply of the station is liable to pollution owing to the unprotected state of the catchment area, and also to the fact that the reservoirs and galvanised cistern are uncovered. The water is not filtered before distribution.

At Cherat there were 80 admissions and 21 deaths, as compared with 17 and 6 respectively in 1896. The disease was prevalent during the early months of occupation of the station, there being 3 admissions in May, 15 in June, 52 in July, 7 in August, 2 in September, and 1 in October. The medical officer in charge attributes the outbreak in May, June and July to the insanitary condition of the regimental dairies, which were under native control, and the milk from which had evidently been adulterated with water from a dirty tank close to the dairies. The enteric bacillus was found in this water and the epidemic ceased when the management and position of the dairies were changed. The cases in the 1st Devonshire and 1st Dorsetshire Regiments and in the 1st Somersetshire Light Infantry, during August, September and October are stated without exception to have been contracted outside the station.

At Dagshai, there were 76 cases with 7 deaths, as compared with 41 and 11 respectively in 1896. By months the admissions were :—March, 2 ; April, 20 ; May, 15 ; June, 21 and July, 18. Two companies of the Royal West Surrey Regiment garrisoned Dagshai up to the 20th March when the head quarters and the other companies arrived. The regiment remained at Dagshai until the 3rd August, when it left for Jullundur, and subsequently joined the Malakhand Field Force. During this period there were 68 admissions. Two companies of the 1st Battalion Bedfordshire Regiment were in the station from 12th April to 7th August and had 8 admissions for enteric fever. On the 4th August two companies of the 1st Royal Highlanders arrived from Subathu and remained till the end of the year, along with other small detachments, but no cases occurred among them. The medical officer in charge attributes the disease to contaminated water, containing the enteric bacillus, obtained in bazars and villages outside the cantonment. Every precaution was taken with regard to the boiling of water and milk inside cantonments. In his sanitary report he remarks :—"The water supply is " obtained from springs in the hill-side immediately under the bazar, the " barracks, hospitals and officers' bungalows. The population on the " Dagshai hill during the hot season is estimated at about 5,000, and with " the geological formation of the place I consider that the source is always " liable to contamination. Hence the prevalence of enteric fever, dysentery " and bowel complaints among the British residents at certain seasons of the " year." No filters are used, the drinking water is stored in the galvanised

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iron tubs of the old Macnamara filters, after being boiled, and, when cold, permanganate of potassium is added at night. An officer was detailed daily to see that the water was actually boiled, and it was once, without any warning, tested bacteriologically and found absolutely sterile. In spite of these precautions there were 80 cases of enteric fever, (including 1 officer and 3 women), many cases of diarrhœa and several of dysentery. It is in contemplation to vacate the station temporarily with a view to sanitary improvements and the introduction of a new water supply.

At Bangalore the cases numbered 67 and the deaths 12. In 1896 the numbers were 47 and 16 respectively. The following table gives the admissions and deaths in each corps by months:—

By months.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Total.	
Corps.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
8th Hussars ...	3	1	3	—	3	—	3	—	3	1	1	1	2	—	2	1	3	2	1	—	—	—	—	—	24	6
"M" Battery, R.H.A. ...	—	—	1	—	1	—	—	—	—	—	1	—	1	—	2	1		—	1	—	—	—	—	—	7	1
8th Field Battery, R.A.	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—		—	1	—	—	—	—	—	3	—
21st Field Battery, R.A.	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—		—	—	—	—	—	1	—	3	—
1st Dorset Regiment ...	1	—	13	2	4	1	2	—	—	—	2	—	3	2	—	—		—	—	—	—	—	3	—	29	5
Military Prison	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	1	—	—	—	—	—	1	—
Total	4	1	17	2	10	1	5	—	3	1	5	1	6	2	4	2	..	2	4	—	—	—	4	—	67	12

It will be observed that the disease was spread over the whole year and not localised in any particular corps. The medical officer in charge was unable to trace the source of infection in a single instance.

At Jhansi there were 63 cases (excluding 9 cases transferred from the rest camp and Royal Artillery practice camp) with 17 deaths (including one amongst cases remaining from the previous year) as compared with 28 and 8 respectively in 1896. In January there were 5 cases; February, 3; March, *nil*; April, 3; May, 3; June and July, *nil*; August, 1; September, 9; October, 3; November, 8; and December, 28 (excluding those sent in from the Royal Artillery practice camp). On the 30th November the 80th Field Battery Royal Artillery and No. 9 Company, Western Division, Royal Artillery, went into practice camp about 5 miles from barracks, and from the 4th to the 31st December there were 18 cases in the former, and 2 in the latter unit. During the same period there were 15 cases in the 1st East Surrey Regiment in the station, and not a single case in the 24th and 59th Field Batteries, who were also in the practice camp. The medical officer in charge states that of the 35 cases admitted during the month of December (including the 7 transfers from practice camp), 10 contracted the disease either when acting as hospital orderlies or when under treatment in hospital for other complaints, and that the majority of these men contracted the disease in one ward, the probable source being butter and sweets surreptitiously brought from the regimental bazar by a temporary ward servant. In barracks the two units affected, (the 80th Field Battery and No. 9 Company, Western Division, R.A.), used water from the same well. The water was boiled and treated with permanganate of potash and was chemically and bacteriologically good. In camp all the batteries used water from the same well.

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At Chakrata there were 54 admissions (excluding 2 cases transferred) with 6 deaths, as compared with 8 and 1 respectively in 1896. The 2nd Royal Inniskilling Fusiliers arrived at Chakrata 950 strong on 26th and 27th March and had 27 admissions (including the 2 transfer cases) during its stay there; in March, 5; April, 19; May, 2; June, *nil*, and July, 1. Other details, strength 740, arrived at Kailana on the 10th and 11th April and had 29 admissions during the year, namely, in April, 9; May, 13; June, 2; July, 1; August, 3; and September, 1. The medical officer in charge states that the details contained a large number of young soldiers and of soldiers who had been but a short time in India. Eleven of the cases admitted developed the disease before arrival at the station, and one on the day of arrival, 9 probably contracting it at Meerut, 1 at Fyzabad, 1 at Cawnpore and 1 at Roorkee. 26 developed first symptoms from 1 to 21 days after arrival, 5 from 23 to 27 days, and the remainder after that period. In 43 cases, accordingly, the onset of the disease was either before or within four weeks of arrival at the station, leaving 13 men in whom the first symptoms developed after this period of residence, and who therefore must be considered to have contracted the disease locally. Of these 13, probably 5 contracted the fever in Chakrata and 8 in Kailana.

The medical officer in charge attributes the majority of the cases to infection from the soil of rest camps on the march up or from the floors of the cook-houses. With regard to "dust infection" the medical officer states that 5 cases of enteric fever occurred in one barrack room in Kailana. In 2 the onset began within three weeks of arrival and therefore the infection may have taken place on the line of march, and in 3 the onset was from 26 days to 2 months after arrival. There was no obvious sanitary defect connected with the room referred to, the cook-house and other conditions were common to it and two other barrack rooms, and "the only conclusion "to be drawn is that the dust of this room was infected, if we assume the "disease to have been contracted locally." Three cases also arose in one of the barrack rooms, where men were being treated for venereal disease. It was a 12 bed ward a quarter of a mile from the enteric wards and had everything in common with other rooms of the barrack used as a hospital, yet no cases occurred except in this room. One patient first complained of febrile symptoms after being 51 days in the ward, the second 18 days after admission, and the third 25 days after admission to the ward. On the old boards being taken up, the soil and rubbish underneath removed and the ward re-floored, no more febrile cases occurred. Water and milk supplies were not considered the cause of the disease. On the line of march every precaution was taken, the troops warned against eating vegetables or bazar products likely to convey infection, hawkers were not allowed in camp, and all water and milk were boiled. At Chakrata and Kailana the water supply was carefully investigated before the arrival of the troops in March, and samples taken from several points were found bacteriologically pure. The water as well as the milk was, however, boiled. Later in the season samples of water, including aërated waters, were again examined and found free from the enteric microbe.

Quetta had 52 admissions with 11 deaths as against 140 with 22 respectively in 1896. The number of admissions and deaths by corps were:—Royal Artillery 4 admissions, 2nd Border Regiment 23 admissions and 5 deaths, and 2nd Lancashire Fusiliers 25 admissions and 6 deaths. By months:—1 admission in January, 1 in May, 4 in June, 13 with 1 death in July, 4 with 6 deaths in August, 11 and 2 deaths in September, 12 and 1 death in October, and in November 6 with 1 death. The disease was not confined to any particular block or barrack. The source of the disease is uncertain. No sanitary defect in barracks or their surroundings was noted; the drinking water, which is of a pure quality, was as an additional precaution boiled and pinked with permanganate of potash during the year, the cook-houses were clean, and the cooking cloths boiled and cleaned every evening; the regimental dairies were under strict supervision and were always in a clean condition, all milk being boiled and taken to barracks in locked tin cans provided with taps.

At Benares there were 42 cases (excluding 1 transferred), with 9 deaths, as compared with 54 and 9 in 1896. One case occurred in March, 11 in

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April, 9 in May, 3 in June, 1 in July, 7 in August, 5 in September, 3 in October, and 2 in November. The majority of the cases were of a very severe type. During the year water has been obtained from the Municipal Waterworks. The medical officer in charge remarks that the water "does "not appear to have affected enteric fever in the slightest. Permanganate "of potassium is used, and this is allowed more as a concession to popular "credulity than to any benefit likely to be derived from it."

At Allahabad 3 men of the 54th Field Battery, R.A., were admitted and 2 died, and there were 38 cases with 11 deaths in the 1st Norfolk Regiment, a total of 41 admissions (excluding 2 cases transferred from the line of march, one of which was fatal) and 14 deaths, as compared with 97 admissions and 29 deaths in 1896. Three cases occurred in January, 6 in February, 14 in March, 6 in April, 1 in May, none in June, July, and August, 3 in September, 1 in October, 1 in November, and 6 in December.

At Poona 36 men were admitted and 5 died. The numbers in the previous year were 35 and 12 respectively. Monthly, the admissions were :—

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
2nd Durham Light Infantry and Details, Wanowrie Barracks.	—	—	4	2	1	—	3	4	8	2	1	—	25
2nd Royal Irish Rifles, Ghorpurie Barracks.	—	—	2	—	1	—		2	4	—	—	—	11
Total	—	—	6	2	2	—	5	6	12	2	1	—	36

The majority of the cases came from the Wanowrie lines, including one from the military prison. During the whole year the water was boiled and treated with permanganate of potash.

At Subathu the incidence of enteric fever is peculiar. During the season of 1896 (March to October), the 1st Battalion Black Watch (Royal Highlanders) had 109 cases with 15 deaths. The regiment left for Umballa on the 15th and 16th October, 1896, but a detachment remained throughout the winter to garrison the place along with the women and children. No cases of enteric fever, however, occurred in the station either in this detachment nor among the women and children. The battalion returned on the 23rd and 24th March, and during the rest of the year there were 33 admissions for, and 6 deaths from enteric fever. The outbreak was divided into three groups, the first within four weeks of the return of the regiment, during which period 17 cases occurred, namely, one case in the first week (25th to 31st March), 5 cases in the second week (1st to 7th April), 10 cases in the third week (7th to 14th April), and one case in the fourth week (14th to 21st April). The outbreak then ceased. With regard to this group of cases the medical officer in charge remarks that "the water at some of the "camps on the march up was reported to be 'exceedingly bad,' and though "every care was taken to boil it, it is always difficult to check imprudence "on the part of hot and thirsty men, and often impossible to ensure "cleanliness on the part of native cooks and other followers, if impure water "is at hand. The two companies which marched with the regiment but "went on to Jutogh developed enteric immediately on arrival there. The "Royal West Surrey Regiment, which marched the same road one day in "advance of the Black Watch, developed enteric immediately on arrival at "Dagshai. The same occurred to the Bedfordshire Regiment, which marched "by the same road to Solon some days after the Black Watch. The one "condition common to all these different bodies of men is the fact that they "all marched along the same route at very much the same period, and the "conclusion seems irresistible that the seeds of the disease were picked up "en route." The next group consisted of 3 cases only, 2 admitted in May and 1 in June. The first man was admitted on the 5th May, and the attack is said to have been probably connected with the fact that the spring from which part of the drinking water was then obtained was reported to be infected with the bacillus of enteric fever, although no direct relation between this water and the attack could be traced. The second man admitted was a patient in hospital for secondary syphilis, and fever symptoms were noticed on 8th May. He had used milk from a dairy close to the spring in the water of which the enteric bacillus was found. The third case was clearly imported, the man having left Umballa on the 1st June, reaching Subathu the next day and being admitted on the 3rd June. The remaining 13 cases form the third group, and their commencement is coincident with that of the rainy season when the water supply is specially liable to contamination from surface washings. The admissions were 4 in July, 4 in August, and 5 in September. The last case was admitted on the 27th September, when the rains also ceased. Every precaution was taken to guard against and check the spread of the disease, the medical officer in charge remarking that out of the 33 cases, 19 were imported from outside. The cases were distributed amongst the several barracks, but none occurred in the barrack occupied by married soldiers.

At Ahmednagar there were 30 admissions with 11 deaths (the latter including 2 men admitted in December, 1896), as compared with 13 and 2 in the year preceding. Three cases occurred in the 40th Field Battery Royal Artillery, 17 in the 2nd Middlesex Regiment, 9 in the detachment 1st East Yorkshire Regiment and one man belonged to the 20th Hussars while on furlough from Mhow. By months the admissions were :—January 4, February 1, March 3, April 9, May *nil*, June 2, July *nil*, August 2, September 5, October *nil*, November 2, and December 2. The medical officer in charge remarks : "As regards the source of the disease considering the care "bestowed on the boiling and sterilizing with permanganate of potash of the "drinking water, the attention paid to the preparation and cooking of food, "the supervision of the milk and butter supplies and of the manufacture of "aërated waters, and the very efficient way in which conservancy was "carried out in the barracks of the 2nd Middlesex Regiment, which corps "furnished most of the cases, it is hard to believe that the disease originated "in barracks. I believe there would be a remarkable diminution in the "number of enteric cases if the troops were prohibited from visiting the "bazars where they drink aërated waters manufactured without any attempt "first being made to purify the water and tea to which is added milk "probably adulterated with dirty water, and consume with their bread "butter made amid unclean surroundings and over which flies, perhaps from "a neighbouring privy, have crawled ;" but he also adds, "although the "majority of cases are probably contracted in the bázars there is a con"siderable number that these places cannot be held accountable for, such as "the later ones admitted in the last quarter of the year, when on the "outbreak of plague, the bazar was evacuated and placed out of bounds and "the city likewise closed to the troops." The water supply is from an unlined subterranean aqueduct liable to pollution through percolation of surface water and by unclean vessels used at the different shafts or dipping wells opening into it in its course.

At Nasirabad 25 men were admitted and 12 died, as compared with 29 admissions and 12 deaths in 1896. There were 7 cases in the Royal Artillery, and 18 cases in the infantry. By months the admissions were :—4 in January, 7 in April, 2 in May, 1 in June, 3 in August, and 8 in September. April and September always give the largest number of cases and the disease is of a more severe type than in the other months. During the last six years there has only been 1 case in February and none in July and November. Of the 25 men attacked, 10 were total abstainers. It is noted that, in 1896, 9 cases occurred in Nos. 1 and 2 infantry barracks, the floors of which as well as their cookhouses were in a bad state of repair. The old floors were taken up, 3 inches of the old soil replaced by clean soil and paved with Neemuch flag-stone, and the cookhouses were improved at the same time, and during the year under report only 3 [illegible] were admitted from these barracks. The drinking water is reported [illegible] the enteric microbe. Yet the well from which it is drawn is open to pollution, as it is used by villagers and others passing by, and water from a well, in which the enteric microbe has often been found, is distributed by stand-posts for other than drinking purposes. *ndia.*

At Rangoon there were 24 admissions with 7 deaths, as compared with 16 and 2 respectively in the year preceding. The cases were distributed generally over the 12 months, but in June and July the disease assumed an epidemic form. In January there were 2 cases; in February, 1; March, *nil*; April, 2 admissions and 2 deaths; May, *nil*; June, 4 admissions and 2 deaths; July, 11 and 2 deaths; August, 1 admission; September and October, *nil*; November 2 admissions with 1 death, and in December 1 admission (an imported case). The cases occurred in all parts of the cantonments. From five infantry barrack rooms 14 men were admitted, while the remaining cases occurred in the station hospital, married quarters and Royal Artillery lines. The hospital and each corps and nearly each barrack have their own water supply, which was boiled before issue, as well as their own milk supply, and the conditions of nearly every case were different. Most of the patients said they had often drunk mineral waters when in the town, not apparently from small native makers but from the recognised manufractures. The medical officer in charge remarks that the only possible grouping of cases was in June and July when 15 cases occurred, and that there appeared to be some connection between this group and the rains. All the wells are guarded by a low parapet and narrow pavement round the mouth, but leakage into the interior through the stone lining is possible. As regards the cases that occurred in the hospital, one man was employed as nursing orderly and his attack may have been caused by some carelessness or want of cleanliness while attending the patients. The other 3 men were in wards far removed from the enteric ward, had been several weeks in hospital with venereal affections and could not have drunk soda water in the bazar within the incubation period. Their only drink was boiled and medicated water, and milk boiled before issue without an opportunity of adulteration except with water from the hospital.

At Barrackpore there were 23 admissions with 1 death amongst the men, as against 25 and 2 in 1896. From January to September there were in all 23 cases, the maximum in any one month being 6 in August, and the only months exempt being October, November and December. Enteric fever is said to be almost a new disease in this cantonment. In 1895 there was only one case, but in 1896 and 1897 the number reached respectively 25 and 23. Although in 1896 bacteriological examination of the drinking water gave negative evidence as to the mode of origin of the disease, it has always been felt that the main source of the disease was drinking water. The records of these two years, and, in a special sense, the record of the year under consideration, in the opinion of the medical officer in charge, affords no support whatever to this view; but he states that "it is a question whether we have "not ourselves been the unconscious agents of the spread of enteric, by the "use of the very measures designed to prevent it, remarking that although "the boiling or the permanganating of the drinking water cannot *per se* do "harm if properly carried out, any one who has watched the mode in which "these measures are carried out, cannot fail to be struck with the fact that "it is a most dangerous proceeding. In collecting, boiling, cooling, transfer-"ring to and methods of storage, one can imagine numerous modes in "which the organism of enteric may be introduced to our already bacillus-"free water." The first case was admitted on the 20th January and the last on the 7th September, 14 occurred in the 41st Field Battery Royal Artillery, and 5 in the 16th Company Western Division Royal Artillery, and 4 in the detachment 2nd Royal Munster Fusiliers No peculiarity as regards food or habits appeared to exist, some drank milk, some never did, some were teetotallers and some beer drinkers. 'Summing up the facts as to local etiology of the disease, the medical officer in charge says that he can state nothing of value for future guidance in its prevention, but adds that, "since there is no "evidence that the drinking water is contaminated, it would seem to be "quite unnecessary to direct our attention to it. It should therefore be used "direct from the pipe without boiling and storing. The influence of contact "with the native as a source of dissemination of the disease has recently "become a subject for consideration. We find recorded instances of

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"microbial infection of food supplies in soldiers' kitchens, in dish cloths, "here, there and everywhere. I cannot personally consider that such "evidence is of much practical utility to officers of the Army Medical Staff, "unless we are informed as to the source or sources of such infection. I "fail to see of what practical use the information given as to the results of "bacteriological examination is, if we are unable to carry the enquiry even "one step further. That the habits of the class of natives employed in "kitchens are filthy, must be admitted, that the enteric microbe appears to "be widely disseminated in India is of course known, and that the filthy "clothes, the traditionally filthy methods of supplying to the soldier his food "stuffs, has much to say to the origin of enteric is probable, and it is not "surprising that the enteric bacillus is found in our kitchens. It will be "seen that I can afford no information as to the etiology of the disease in "Barrackpore, that bacteriology has not hitherto aided us, and it must be "confessed that this is profoundly disappointing when we have been led to "expect so much."

At Jubbulpore enteric fever furnished 23 cases being 5 less than in 1896, 5 occurred in the Royal Artillery and 18 in the Infantry. There were 5 deaths, 2 in the artillery and 3 in the infantry, against three in the previous year. There were 2 admissions in January; 2 with 1 death in February; 6 with 1 death in March; 1 admission and 1 death in April; 4 admissions in May; 1 admission in June; 3 admissions in August; 3 admissions and 2 deaths in September and 1 admission in December.

At Campbellpore the cases numbered 21 and the deaths 5, the largest number during the last six years. In 1896 the numbers were 4 and 2 respectively. There were 2 admissions in April, 8 in May and 11 in June. The first case was admitted on the 4th April. The man was a member of the Army Temperance Association, belonged to the 57th Field Battery Royal Artillery, which arrived from England on 26th November, 1896, and occupied the same barrack room in which a case occurred in the previous year, sixteen days after the arrival of the battery at Campbellpore. Within the next six weeks 4 more men were admitted from the same barrack room and battery, the first 3 of whom also belonged to the Army Temperance Association. Next a man of the 12th Company Eastern Division Royal Artillery, also a member of the Army Temperance Association, was taken ill and then the disease broke out in other barrack rooms, the last case being admitted on the 26th June. The medical officer in charge attributes the disease to mineral waters and food stuffs obtained from the native bazar. The bazar water supply he considered to be bad, as it was obtained from one public well near which the elephants were washed and from private wells with insanitary surroundings. The water supply of the cantonment is abundant and pure and is obtained from deep wells, covered over, however, with a wooden cover only, and drawn by hand in zinc buckets.

At no other stations than those specially noted above did the number of cases exceed 20.

Other continued fevers.—There were 2,749 cases of simple continued fever with 1 death and 1 of cerebro-spinal fever, while the average number of men constantly sick was 126·06, being in the ratios of 42·6 per 1,000 for admissions, ·02 for deaths and 1·95 for constantly sick, an increase of 12·6, ·02 and ·43 respectively on the corresponding ratios of the previous year. In the preceding year there were no deaths. Compared with the average rates for the preceding ten years there is a decrease of 7·1 in the admission and of ·08 in the constantly sick rate, the decline in the death rate being ·01. The highest rate of admission, 135·8 per 1,000, occurred in the Aden district, which had the third lowest ratio (4·9) in 1896, an increase of 130·9. No satisfactory cause is assigned for this increase. The next highest admission rate was 109·8 in the Rangoon district, which in the previous year stood third with 80·5, followed by 103·8 in the Allahabad district, which had the second highest ratio in the preceding year with 112·3, and by 100·2 in the Nagpur district, an increase of 90·6. The cases were admitted chiefly during the months of May, June, July and August. As in 1896, there were no admissions in the Sind district; the next lowest rate ·4 per 1,000, occurring in the Peshawar district, which, with ·3, was also second lowest in 1896. Other low ratios are ·7 in the Belgaum district, where there were no admis-

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sions in the preceding year, and 1·7 in the Quetta district, a decrease of 6·5. In addition to the increases already mentioned, the Secunderabad, Bangalore and Bundelkhand districts show an increase of 73·1, 56·7 and 41·5 respectively, while other increases were less than 30. The largest decreases were 63·1 in the Mandalay district, which had the highest admission ratio, 140·3 in 1896, 19·5 in the Lahore and 13·9 in the Bombay district. In 1896 these two districts stood fourth and fifth highest with 70·7 and 53·2 respectively.

Cholera caused 116 admissions and 80 deaths as compared with 70 and 63 respectively in 1896, the equivalent ratios being 1·8 and 1·24, which are higher respectively than those in the preceding year by ·8 and ·35, and lower by only ·1 and ·11 than the average rates for the previous ten years. Abstract XIX shows the stations at which cholera occurred in each quarter of the year. It will be observed that 92 cases with 59 deaths occurred in the third quarter, 19 cases with 17 deaths in the second, 4 cases with 3 deaths in the fourth and one fatal case in the first quarter.

The station at which the greatest number of cases is shown was Sitapur, where there were 65 cases with 40 deaths. This severe epidemic occurred between the 10th and 17th September and was of a most malignant form, the men first attacked being simply struck down by the intensity of the poison, dying in the stage of collapse in a few hours. Towards the end of the outbreak the disease assumed a milder type. Cholera had been raging in the surrounding villages for some time before it attacked the troops. A large proportion of the men attacked were members of the Army Temperance Association, and the cholera microbe was detected in several articles of food and drink found in the room of the Association the morning after the outbreak, but not in the drinking water of the station.

At Muttra there were 9 cases, 8 proving fatal; 7 occurred in June, of which 6 proved fatal, and 2 in November, both fatal. The first outbreak was due to drinking water from a well which had been contaminated with the cholera microbe from a native who was employed on building works, and who was taken ill close by, the disease being then prevalent in the surrounding district. The attacks occurred in one squadron only, and when it was sent out to camp, and the barracks and well were cleaned and disinfected, no more cases occurred. The second outbreak of 2 cases is supposed to have been due to eating country made bacon.

At Jhansi there were 4 fatal cases between 10th August and 3rd September. There was no connection between any of them as they occurred in separate barrack rooms, companies and corps. As each case occurred the men of the barrack were placed under canvas and every precaution taken to prevent the spread of the disease.

At Nasirabad there were 4 cases, 3 proving fatal. The first case occurred on the 26th July in No. 2 British Infantry barracks, and is attributed to the eating of unripe fruit bought from a native hawker, the second on 5th August in No. 3 Royal Artillery barracks, attributed to too long a stay in the plunge bath, the third on 12th August in No. 28 British Infantry barracks, attributed to the drinking of impure water on the journey from Poona, and the fourth on 26th August in No. 2 Royal Artillery barracks, the probable cause not being stated.

At Secunderabad 4 men were admitted and 2 died. The first case occurred in June in a man of the 1st Dorsetshire Regiment, who had come on a visit from Bangalore to his mother, who was matron in the Civil Hospital, and who was attacked with cholera a few hours after her son's arrival, and died the following day. The son nursed his mother throughout her illness, and himself contracted the disease on the morning of the fourth day after his mother's death, dying the same day. The two next cases occurred in July in the Artillery and first Infantry lines. Both recovered, and the cause of the disease could not be traced. The fourth case occurred in August in the second Infantry lines. The patient had been all the morning of the day he was taken ill, at Chadarghat, about six miles from barracks, where cholera was then prevalent. The case was fatal the same day.

At Deolali there were 3 fatal cases. All the cases occurred during the month of June, the men being convalescents sent from Bombay, Poona and Kamptee respectively. They had been at the depôt for 10, 20 and 30 days

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respectively before being attacked. The source of infection was not discovered in any of the cases.

At Belgaum there were 3 cases, 2 proving fatal. The first two cases, both fatal, occurred in April and the third in May. The source of infection could not be discovered, but cholera was prevalent among the native population of the city and surrounding district at the time.

At Fort Allahabad 3 men were admitted and 1 died. The first case, which proved fatal, was contracted in the bazar, but the man did not report himself sick till seven hours after the attack. The second case is supposed to have contracted the disease from the latrine which the first man had used before his admission into hospital, and the third case had been employed as hospital orderly.

At Fort William there were 2 fatal cases. The first case occurred on the 14th April. The patient had arrived from Bombay the day before and had drunk a large quantity of water on the journey. The second case also occurred in April, in a man who belonged to the detachment in Fort Fulta, but who had been on leave in Calcutta within two days of his attack. He had probably visited the native bazars where cholera is endemic and specially prevalent in the month of April. He died immediately after admission.

At Umballa 2 cases of cholera were admitted in August from the 1st Dorsetshire Regiment, while on its way from Bangalore to Rawal Pindi, one of the cases proving fatal. The regiment halted at Umballa for 11 days, during which period no other case occurred.

There was a fatal case each at Allahabad, Lucknow, Fyzabad, Cawnpore, Agra, Delhi, Hyderabad and Kamptee; and an admission each at Mian Mir, Bellary, Poona and Kirkee.

There were 6 fatal cases among troops on the line of march, one of which occurred without admission into hospital.

Dysentery.—There were 2,215 admissions for dysentery and 82 deaths, being in the ratios of 34·3 and 1·27 per 1,000, which are higher respectively by 8·2 and ·59 than the preceding year's rates. As compared with the ten years' average, the ratios are higher by 6·2 and ·60 respectively. The average number of men constantly sick was 166·89, giving a ratio of 2·59 per 1,000, which is ·78 higher than in the previous year and ·66 more than the average of the preceding ten years. Abstract XX shows the prevalence of this disease in each military district in India, and Abstract XXI its prevalence in each quarter of the year. The highest admission rate occurred in the Madras district, and was 79·6 per 1,000, which is an increase of 14·1 on the preceding year's ratio, the second highest being 58·2, in the Peshawar district, an increase of 45·1, and the third highest 57·6, in the Secunderabad district, an increase of 11·0. In the previous year the three highest ratios were in the Madras, Narbudda and Presidency districts. The lowest ratio, 9·8 per 1,000, was in the Nagpur district, as compared with 22·9 in 1896; the next lowest being 14·7 in the Poona district, a decrease of 4·9, and 15·0 in the Meerut district, a decrease of 7·2. Mortality was highest in the Peshawar district, 4·21 per 1,000, as compared with ·35, and the next highest mortality rate was in the Presidency district, 3·62, as against 1·68 in the preceding year, followed by 3·08 in the Bundelkhand district, against *nil* in 1896. No mortality occurred in the Rohilkhand, Southern, Poona, Bombay, Deesa, Aden, Sind or Nagpur districts. The next lowest mortality ratios were ·48 in the Meerut district, an increase of ·02, ·60 in the Bangalore district, against *nil* in 1896, and ·67 in the Belgaum district, a decrease of ·41. Comparing the four quarters of the year as to seasonal prevalence of the disease, the largest admission ratio, 12·9 per 1,000 of strength, occurred in the fourth quarter, followed by 10·0 in the third, 6·8 in the second and 5·7 in the first quarter. In the preceding year the third quarter showed the greatest prevalence, followed in order by the second, fourth and first. The mortality rate was also highest, ·72 per 1,000 in the fourth quarter, followed by ·32 in the third, ·21 in the second and ·10 in the first quarter. In the previous year the mortality was highest in the second quarter, followed by the third, fourth and first quarters.

The station at which the greatest number of cases occurred was Secunderabad, where there were 151 admissions with 4 deaths, as compared with 137 and 1, also the largest number in 1896. The cases were of a severe

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type, and there were more relapses than usual. Other stations showing a large number of admissions for dysentery are remarked upon as follows in the Principal Medical Officer's report.

At Peshawar there were 121 admissions with 9 deaths. The medical officer in charge attributes the disease to malaria.

At Rawal Pindi there were 108 admissions with 5 deaths, as compared with 28 admissions and 1 death in 1896. There were 5 admissions in January, 4 in February, 1 in March, 7 in April, 4 in May, 4 in June, 1 in July, 5 in August, 11 in September, 18 in October, 25 in November and 23 in December. It will thus be seen that 82 cases occurred in the last five months of the year. The majority of the men belonged to corps connected with the North West Frontier operations, and the disease was either contracted on service or caused by the great diurnal ranges of temperature.

At Lucknow there were 108 admissions with 3 deaths, as against 63 admissions in 1896. The medical officer is unable to account for this increase, and states that "the disease is endemic in Lucknow and although " most prevalent in the cold weather is not markedly so, for cases occur " generally throughout the year. The cause is obscure, and I have not been ' able to associate it with any particular condition of the individual or his " environment. The disease is generally of a mild type and susceptible to " treatment as is shown by the fact that only 3 cases proved fatal and only 6 " had to be invalided."

At Bangalore there were 92 admissions with 1 death, as against 65 and no death the year before. Many of the men had relapses, and some were readmitted twice and three times. The medical officer states that "dysentery is not an infrequent complaint, the main causes being chill and damp in the monsoon and neglect of clothing."

At Agra there were 63 admissions with 3 deaths, an increase on the numbers admitted in 1896. Many of the cases are said to have had their origin in Mauritius.

At Umballa there were 61 admissions with 5 deaths, in 1896 there were 30 cases and in 1895 51; 19 of the cases were admitted in November, 11 of whom were from the 3rd Battalion Rifle Brigade recently returned from the Tochi Field Force; the other cases were fairly evenly distributed over the year.

At Barrackpore there were 58 admissions with 9 deaths, as compared with 55 admissions the year before. There were 2 cases in January, 3 in February, 2 each in March, April and May, 7 in June, 10 in July, 15 in August, 10 in September, 2 in October, 1 in November and 2 in December. The medical officer states that the history of 1896 gave grounds for considering that the probabilities were all in favour of a recrudescence of dysentery during the rainy season, but he was not prepared for so violent a form of the disease. As the disease coincides with the rainy months, when the river is swollen and the pipe water often turbid, it was regarded as of water-borne origin, but insistence on this point having led to no good result, the possibility of its dependence on a damp water-logged soil was suggested. As Dum Dum and Calcutta, where, with the exception of sub-soil drainage, the conditions are similar, compare favourably with Barrackpore as regards dysentery, the medical officer in charge of the last named station states that he is compelled to suspect that the disease is of soil origin, and that apparently there is "no connection between the fatal forms of colon " affections which we have witnessed and malaria, for reference to the periods " of greatest prevalence of malarial fevers and of dysentery shows that they " were not coincident. It appears therefore that the colon disease was an " affection *sui generis*. All that can be positively stated concerning its " etiology is that its incidence coincides with the rainy season and its " dependency on drinking water is not supported by the result of our " sanitary work, however defective such work has been." He adds that he has time after time drawn attention to the imperfect removal of rain water in and around barracks, as the ground in the vicinity is rarely, and that to the north never, dry, and it is consequently an undrained quagmire. He concludes, "I am now, I confess, rapidly coming to believe that in the " undrained state of the barracks we have one potent factor in the causation " of this disease, of which impure water may be another. Dysentery has

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"of course always been prevalent in lower Bengal, and we may well suppose, "if we desire observed facts to be in consonance with modern scientific "research, that the damp soil and the humid hot atmosphere is as suitable "for the *amœba coli* as it is for the *plasmodium malariæ*."

At Rangoon there were 56 admissions with 2 deaths. The cases were mostly of a mild type and readily yielded to treatment. In the year preceding there were 74 admissions and 3 deaths.

At Allahabad there were 51 admissions with 1 death. The cases were also mostly of a mild type yielding readily to treatment with ipecacuanha.

At no other stations than those noted above did the number of cases exceed 50.

Malarial fevers.—Under this head are included 22,310 admissions for ague with 17 deaths and 1,186 cases of remittent fever with 27 deaths, giving a total of 23,496 admissions and 44 deaths, with an average number constantly sick of 916·08 men. An invalid died from ague after leaving the Command. The ratio of admission was 364·1 per 1,000, that of mortality ·70 and of constantly sick 14·20. These rates were respectively 111·2, ·17, and 4·05 per 1,000 higher than in the previous year. As compared with the decennial average rates the admission and constantly sick rates are respectively 13·1 and 2·64 higher, and the death rate identical. The greatest ratio of prevalence of these diseases in any district was 1017·0 in Sind, which is 269·4 in excess of the previous year's rate. The Narbudda district, which had the third highest ratio in 1896, comes next with 824·4, an increase of 137·5 and Deesa, which had the highest admission ratio in the preceding year, follows with 748·5, a decrease of 79·3. The lowest ratio 48·1 per 1,000, occurred in the Rangoon district, a decrease of 82·7, the next lowest being 51·0 in the Bangalore district, which had the lowest rate in 1896, a decrease of only ·8, and 58·6 in the Southern district, a notable decrease of 96·3. In addition to Sind and Narbudda, 18 other districts show increased rates, notably the Lahore, Bundelkhand and Peshawar districts with increases of 359·8, 319·5 and 251·1 respectively. The remaining increases ranged from 25·6 in the Sirhind to 156·7 in the Meerut district. Besides Deesa, Rangoon, Bangalore and Southern, the Quetta and Aden districts had reduced ratios of 61·3 and 2·7 respectively. Of the 44 deaths in India, 8 occurred in the Peshawar district, 6 in Lahore, 5 in Mandalay, 4 in the Presidency, 3 in Rawal Pindi, 2 each in the Narbudda, Sirhind, Bangalore, Mhow, Deesa and Quetta districts, and 1 each in the Rohilkhand, Bundelkhand, Madras, Poona and Aden districts, and also 1 on the line of march.

Septic diseases.—There were 122 admissions and 10 deaths (the latter including that of an invalid) comprising 112 cases (6 fatal) of erysipelas, of which 20 (2 fatal) were returned as the phlegmonous variety, 6 of sloughing phagedœna, 3 fatal cases of septicæmia, and 1 case of pyæmia. The death of the invalid was due to phagedœna. The ratio of admission was 1·9 against 1·6 per 1,000 in the preceding year and ten years' average, and that of mortality ·15 as compared with ·17 in the previous year and ·10 the decennial average; 9·28 men were constantly sick, giving a ratio of ·14 as against ·09 the year before and ·10 the average rate for the preceding ten years. The districts contributing the largest number of cases were Sirhind with 32, Rawal Pindi with 20, Lahore with 14 and Quetta with 12. In other districts the numbers did not exceed 10.

Tubercular diseases caused 330 admissions, 52 deaths (including 12 of invalids), and the constant inefficiency of 59·18 men, being in the ratios of 5·1, ·80 and ·92 per 1,000, as compared with 5·8, ·74 and ·93 respectively in the previous year, and 4·1, ·82 and ·74, the corresponding average rates for the preceding ten years. 282 admissions and 48 deaths (including those of 11 invalids) were due to lung affections. Every district had cases of these diseases. The Belgaum, Bombay and Madras districts, (which, as regards prevalence of tubercular diseases, stood respectively fourth, highest and second in the previous year), furnished the highest admission ratios, namely, 22·7, 18·9 and 13·6, the Peshawar district coming next with a ratio of 7·4. These ratios show an increase of 11·9 and 3·9 in Belgaum and Peshawar districts, and a decline of 19·9 and 10·6 in the Bombay and Madras districts, as compared with the corresponding ratios in 1896. In the Aden district the rate was 3·7 higher than in the previous year, but in the other districts

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the increase was comparatively low, varying from ·1 in the Nagpur district to 2·1 in the Meerut district. Besides the two decreases above mentioned, Secunderabad had a decrease of 11·0, Deesa of 5·2, and Narbudda of 5·0, the decrease in the other districts varying from ·2 in Poona to 2·6 in the Sirhind districts. Of the 40 deaths in India, 7 occurred in the Rawal Pindi district, 4 each in the Presidency and Lahore districts, 3 each in the Peshawar and Bombay districts, 2 each in the Oudh, Sirhind, Madras, Belgaum, Secunderabad, Mandalay and Mhow districts, and 1 each in the Allahabad, Rangoon, Poona, Deesa and Quetta districts.

Venereal diseases.—For *primary syphilis* alone there were 8,108 admissions (1 fatal) equivalent to a ratio of 125·6 per 1,000, which is lower by 33·7 than in the preceding year, and by 1·9 less than the average rate of the previous ten years. The average number of men constantly sick from this cause amounted to 781·79, being in the ratio of 12·11 per 1,000, which is also lower than in the year before by 2·39 but above the ten years' average by 1·20. For *soft chancre* there were 5,500 admissions and 448·22 men were constantly sick, making, with the admissions for primary syphilis a total of 13,608 admissions for primary venereal sores with 1230·01 men constantly sick. These numbers give an admission rate of 210·9 per 1,000 (a decrease of 15·5 as compared with 1896, but an increase of 10·9 on the decennial average), and a constantly sick rate of 19·06 (a decrease of ·63 as compared with the previous year, but an increase of 2·88 on the average for the preceding ten years). The admissions for *secondary syphilis* were 6,853 (with 26 deaths, including 4 of invalids) and there were 751·74 men constantly sick. The admission ratio, 106·2, that of mortality ·40, and that of constantly sick 11·65, were higher by 8·5, ·17 and 1·18 respectively, than in the preceding year. Compared with the average of the previous ten years, the rates of admission, death and constantly sick have increased by 44·0, ·28 and 5·32 respectively. *Gonorrhœa* furnished 12,307 admissions, or a ratio of 190·7, with an average constantly sick of 1009·84 men, equal to 15·65 per 1,000. Here also an increase is noticed of 3·3 in the admission and ·95 in the constantly sick rates as compared with 1896, as well as an increase of 14·4 and 2·75 respectively, as compared with the decennial average. There were no deaths from this affection. Taking all these forms of venereal disease together, the ratios of admissions amounts to 507·8 per 1,000, which is less than that of the preceding year by 3·8, but higher than the average rate by 69·3, while for constantly sick the ratio was 46·36, representing a constant inefficiency of 2991·59 men, the ratio being higher than in 1896 by 1·49 and than the decennial average by 10·96.*

The admission rate for venereal affections shows that in the year under report for every 1,000 men there were 3·8 fewer admissions to hospital than in 1896, and the Principal Medical Officer states that this reduction appears to have been connected with the employment of a large number of men on field service in the second half of the year, as the number of venereal admissions was much lower from July to December than from January to June.†

The average stay of a case of venereal disease in hospital was 33·32 days, against 32·10 in the previous year, and the total loss of service was 1,091,930 days, as compared with 1,157,449 days in the preceding year. There were 23 deaths in the Command from venereal diseases equivalent to a ratio of ·35 per 1,000, and 662 men (including 2 for soft chancre) were invalided to England, the ratio being 10·26 per 1,000. In 1896 the corresponding numbers and ratios were 14 or ·20 per 1,000, and 479 or 6·80 respectively.

Comparing next the prevalence of syphilis and gonorrhœa in the various districts, as shown in Abstract XVI, the Secunderabad district gave the

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* There were 76 admissions for ulcer of penis of non-venereal origin, with 5·00 men constantly sick. If, as in former years, these cases were included with those of primary syphilis and soft chancre under the heading of primary venereal sores, the admission and constantly sick rates for all venereal diseases would equal 509·0 and 46·44 respectively.

† It should also be noted in this connection that special cantonment regulations were introduced during the latter half of the year, with a view to the prevention of venereal diseases.

highest ratio of admission for primary syphilis, 249·4 per 1,000, against 259·4, the fourth highest ratio in 1896, the next being the Rohilkhand district (which has held the second place in order of prevalence since the year 1894) with 211·8, a decrease of 88·9; the Belgaum district (which had the highest ratio, 301·3, the year before) with 210·1, and the Narbudda district (which stood nineteenth in the preceding year) 193·0, a marked increase of 101·1. The lowest rate, 37·2, occurred in the Peshawar district, which was lowest but one in the previous year with 46·7, the next lowest rates being 47·9 in the Nagpur district (lowest in 1896 with 33·5) and 53·7 and 58·3 respectively in the Sind and Deesa districts (also third and fourth lowest the year before) a decrease of ·8 in the Sind and of 3·0 in the Deesa district. Besides the decreases just mentioned the admission rate for primary syphilis decreased in the Mhow district (which had the third highest admission ratio in the year preceding) by 125·1, in Bundelkhand by 74·5, in Quetta by 71·9, in Bangalore by 55·7, in Meerut by 55·3, in Allahabad by 53·3, and, to a lesser extent, in all other districts, with the exceptions of the Aden, Madras and Rawal Pindi districts, where there were increases of 44·3, 15·7 and 11·5 respectively, and the Narbudda and Nagpur districts, the increase in which has been indicated above. Secondary syphilis was most prevalent in the Belgaum district, the admission ratio being 226·2 per 1,000, or 99·0 in excess of the previous year's rate. The next highest ratios were 181·7 in the Rohilkhand district, which was also second highest in 1896, with 156·7, 148·9 in the Narbudda district, an increase of 69·1, and 145·3 in the Mhow district, an increase of 33·5. The lowest ratio of admission was 48·3 in the Sind district, a decrease of 21·7; the next lowest being 64·5 and 66·0 in the Peshawar and Rawal Pindi districts (also second and third lowest in the preceding year with 55·7 and 60·4 respectively). In addition to the decrease in the Sind district, decreases exceeding 20·0 per 1,000 also occurred in the Deesa, Presidency, Southern, Bombay and Sirhind districts, amounting to 59·4, 32·6, 26·8, 23·0 and 21·1 respectively. In no other district where there was decrease did the decline exceed 20·0 per 1,000. The ratios increased in as many as 16 out of the 26 districts, the most important increases besides those already mentioned being 53·3 in the Allahabad, 44·6 in the Bangalore, 37·7 in the Meerut, 35·9 in the Rangoon, and 31·2 in the Nagpur districts. The highest ratio of prevalence of gonorrhœa was 313·4 in the Rohilkhand district, or 59·0 higher than in the previous year, when this district had the third highest admission rate; the next highest ratios being 299·6 in the Nagpur district, an increase of 109·4, the largest increase of any in 1897, and 298·3 in the Bundelkhand district, a decrease of 49·3, this district having had the highest admission rate, 347·6 in 1896. The lowest admission rate was in the Quetta district, 137·8, a decrease of 25·9; the next lowest being 140·1 in the Sind district, a decrease of 54·4, and 141·7 in the Bombay district, a decrease of 14·6. The other districts having increases in the admission ratio for gonorrhœa exceeding 25·0 per 1,000, were Allahabad and Peshawar with increases of 76·0 and 53·0 respectively, while the other districts, in addition to those mentioned above, having decreases amounting to more than 25·0 per 1,000 were Deesa, with a decrease of 53·9 and Madras with a decrease of 28·8.

As regards the prevalence of venereal diseases at individual stations, the Principal Medical Officer remarks that the ratio of venereal disease to strength increased in 57 stations and decreased in 47. The highest admission ratios were at Shahjahanpur (978·8), Chakrata (951·9), Saugor (905·8), and Ahmedabad (912·5). The greatest increase of ratio (increases of more than 150 per 1,000) were at Benares, Allahabad, Sitapur, Fatehgarh and Chakrata in the Bengal Command; Attock, Solon, Ghora Dhaka and Cherat in the Punjab Command; Cannanore (low strength), Ramandroog (low strength), Poonamallee and ‘on the march” in the Madras Command; and Kamptee in the Bombay Command. As in the preceding two years, the Punjab Command had the lowest and the Bengal Command the highest ratio of prevalence, while the Bombay Command shows decrease greater than the increases in the other Commands put together. Amongst various points bearing upon the prevalence of venereal diseases in the army in India, the Principal Medical Officer also states that some medical officers consider that venereal disease and ague vary inversely to each other, ague diminishing virility, and notices the influence of the famine in increasing the number of prostitutes. *India.*

The subject of intramuscular injections of mercury is noticed in many reports, as well as continued treatment in barracks as a means of obtaining more thorough cures without losing the services of the men, but in many instances the treatment has not been considered more efficacious than other forms of treatment.

In many stations the primary forms of syphilis are said to have been very severe and to have led rapidly to secondary complications. It is also noted in many station hospital reports that the number of admissions has been increased by the re-admission of the same case several times during the year.

The new Cantonment Regulations were brought into operation in the latter part of the year, but sufficient time had not elapsed to show the effect of the measure upon the prevalence of venereal disease.

Hydrophobia.—There were 2 fatal cases of hydrophobia, 1 at Umballa and 1 at Mandalay. The man at Umballa had been bitten by a mad dog in 1895, previous to his enlistment, and had been treated in the Pasteur Institute. On the 9th December he reported sick, complaining of sore throat, his tongue was furred, he had some streaky congestion of the pharynx and larynx, face flushed with an anxious expression, but no fever. At about 5 p.m. he had a slight convulsive attack and had great difficulty in swallowing a sedative draught. During the night the convulsive attacks increased in frequency and violence and were excited by the slightest noise or draught of air. By 11 a.m. the following day the convulsions were almost continuous and of extreme violence, but his mind remained clear. In the afternoon his strength rapidly failed and at 5.30 p.m., after a severe attack of hæmoptysis he died. The man at Mandalay was admitted into hospital on the 7th October and died on the 9th. About five months prior to admission he was bitten by a dog on the back of the hand, the wound was slight and he did not go to hospital. The dog was noticed to be somewhat queer in its actions and was killed a couple of days after the man was bitten, as it had also bitten another man. On admission there was no sign of the original wound, but he had a small swelling or puffiness of the hand where he had been bitten. This, however, disappeared the next day, but he complained of a pain up the same arm of a neuralgic character. On the following day he had some spasms of the muscles of the throat and complained of dyspnœa, which increased during the evening, when he began to run about the ward grasping his larynx. He could not swallow any fluid and was continually hawking and spitting; he also made a barking sound. This condition continued for several hours, when severe vomiting set in, and after a very severe attack he died rather quietly from exhaustion.

Parasitic Diseases.—There were 707 admissions, which include 373 for ringworm, 156 for scabies, 153 for tænia solium, and 9 for tænia mediocanellata, giving a ratio of 11·0 per 1,000 as compared with 10·7 in 1896, and 11·3, the ten years' average rate. The highest ratio was 74·3 in the Rangoon district, followed by 34·0 in the Sind district and 20·1 in the Sirhind district; the lowest rates, 3·5 and 3·9, occurred in the Quetta and Rawal Pindi districts respectively.

Scurvy.—There were 23 cases of this disease against 18 in the previous year, the ratio ·4 per 1,000, being higher than that for the preceding year by ·1, but lower than the decennial average by the same decimal. Nine cases occurred in the Meerut district, 7 in the Bundelkhand district, 1 each in the Presidency, Rawal Pindi, Peshawar, Poona, Mhow and Sind districts, and 1 on the line of march.

Alcoholism.—There were 336 admissions and 2 deaths, including 8 cases of delirium tremens, 1 of which was fatal. The admission rate, 5·2 per 1,000, was higher than that of the previous year by 1·0, but lower than the ten years' average rate by 2·2. The highest ratio of prevalence was 13·1 in the Nagpur district, an increase of 6·4, the next highest being 10·7 in the Deesa district, which was highest in the preceding year with 19·9, 10·2 in the Poona district, an increase of 8·4, and 10·1 in the Lahore district, an increase of 6·4. The lowest rate was 1·4 in both the Peshawar and Rangoon districts, against *nil* and 5·3 respectively in the year before, the next lowest rates being *ndia.*

1·5 in the Bombay district, a decrease of 3·1, and 2·2 in the Allahabad district, a decrease of ·2.

For *rheumatic affections and gout* 1,920 admissions and 1 death are recorded, of which 137 admissions and the single death were for rheumatic fever, and 13 for gout. The admission ratio, 29·8 per 1,000, was lower than in the previous year by 1·4, but higher than the preceding ten years' average rate by only ·2. The death rate, ·02, was higher than that of the year before by ·01 but below the decennial average rate by ·03. The number constantly sick was 145·90, being in the ratio of 2·26, as against 2·39 in 1896, and 2·08, the average of the preceding ten years. The highest rate of prevalence, 58·1, was in the Aden district, an increase of 37·6 on that for the preceding year; the Mhow district, which was highest in the year previous with 62·7, gave the next rate 50·3, a decrease of 12·4, followed by Peshawar with 40·7, an increase of 18·6. The lowest admission rate occurred in the Secunderabad district, 11·4 per 1,000, a decline of 8·7, the next lowest being 15·0 and 19·8 respectively in the Oudh and Poona districts, a decrease of 7·0 in the former and of ·8 in the latter.

Debility.—1,194 admissions and 2 deaths are returned under this head. One of the deaths occurred in an invalid who had left the Command. The admission rate, 18·5 per 1,000, is 1·4 higher than that of 1896, and 4·7 lower than the average of the preceding ten years. There were 87·67 men constantly inefficient from this cause, being in the ratio of 1·36 per 1,000, as compared with 1·30 in the year before and 1·55, the decennial average rate. The highest admission ratio in any district was 61·3 in the Deesa district, which stood highest in 1896 with 76·2. The next highest was 48·0 in the Madras district, which had the third highest ratio in the preceding year, an increase of 14·8, followed by 38·3 in the Bombay district, which stood second in the previous year with 39·8, a decline of 1·5. The lowest ratio was 3·3 in the Belgaum district, 5·3 less than in 1896, the next lowest being 6·5 in the Secunderabad district, a decrease of 10·8, and 9·8 in the Allahabad district, a decline of 4·6. The death in the country occurred in the Rawal Pindi district.

Other General Diseases gave 372 admissions and 9 deaths, one of the latter being that of an invalid, the equivalent ratios being 5·7 and ·14 per 1,000, as compared with 10·0 and ·15, the respective decennial average rates. The chief admissions were 215 for non-malignant new growths (including 179 for warts, 11 for papilloma, 9 for fibroma and 5 for lipoma), 4 for malignant new growth, all cases of carcinoma, 116 for anæmia, 17 for cyst, 7 for mumps, and 6 for diabetes mellitus. The deaths in India were 4 from carcinoma, 2 from diabetes mellitus and 1 from cyst, also 1 out of hospital from epithelioma. The death of an invalid under this head was due to malignant new growth.

LOCAL DISEASES.—*Diseases of the Nervous System.* 539 admissions are returned and 27 deaths, the equivalent ratios being 8·3 and ·42 per 1,000, or 1·2 lower and ·20 higher respectively than those for the previous year, and 1·8 lower and ·07 higher respectively than the corresponding average rates for the preceding ten years. Of the total admissions 111 were cases of *mental disease*, equal to a ratio of 1·7 as compared with 1·3 in 1896 and 1·7 the decennial average. The highest admission ratio for mental disorders was 5·8 in the Bombay district (which also stood highest in the preceding year with 5·1), followed by 4·6 and 4·2 respectively in the Deesa and Bangalore districts. In the previous year the second and third highest ratios occurred in the Nagpur and Madras districts. The lowest admission rates were ·7 and ·8 in the Peshawar and Secunderabad districts respectively, the next lowest being ·9 each in the Oudh and Bundelkhand districts. The chief causes of admission were melancholia 49, dementia 35, and mania 13 cases; one fatal case only occurring, namely, from dementia in the Bombay district. Excluding mental diseases, the admissions for nervous diseases are 428 with 26 deaths, and 29·75 men constantly sick, the equivalent ratios being 6·6, ·40 and ·46 respectively. The admission and constantly sick rates were 1·6 and ·21 lower than in the previous year and 1·8 and ·13 below the average rates of the preceding ten years, while the mortality ratio was ·19 and ·06 respectively higher in both comparisons. The highest admission ratio, 13·6

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per 1,000, is shown in the Bombay district (which also had the highest rate in 1895 and 1896), a decrease of 7·2; the next highest being 11·0 and 10·3 in the Bundelkhand and Rohilkhand districts, an increase of ·1 and 2·0 respectively. The lowest ratios were 2·8 each in the Aden (also the lowest in 1896) and Narbudda districts, an increase of 1·8 in the former, but a decrease of 4·8 in the latter, and the next lowest 2·9 in the Southern district, a decline of 3·6 as compared with the preceding year. The highest ratio of mortality is noted in the Peshawar district, 1·75 per 1,000, against *nil* in the year before, the next highest being in the Deesa and Nagpur districts, 1·53 and 1·09 respectively as compared with 1·66 and *nil* in the preceding year. There was no mortality in the Presidency, Allahabad, Narbudda, Bundelkhand, Sirhind, Madras, Southern, Bangalore and Mhow districts, and low mortality rates are recorded in the Rawal Pindi, (·19) Lahore (·22) and Oudh (·22) districts. The principal causes of admission were neuralgia (223 cases), epilepsy (53), headache (37), paralysis (33), diseases of the brain and its membranes (31), vertigo (13) and affections of the spinal cord (11). The deaths were due to pachymeningitis (7), abscess of the brain (4), cerebral meningitis and encephalitis (3 each), hæmorrhage in the brain and hemiplegia (2 each) and 1 each from myelitis, posterior sclerosis, acute ascending paralysis, apoplexy and paraplegia.

Diseases of the Eye caused 727 admissions, being in the ratio of 11·3 per 1,000, which is only ·1 above that for 1896 and 1·4 below the average rate for the preceding ten years. There were 47·09 men constantly sick for these diseases, being in the ratio of ·73 which is ·26 higher than that of the year before and ·06 lower than the decennial average rate. The highest rate of prevalence occurred in the Bundelkhand district, namely 21·1, an increase of 6·8 over that of the previous year; the next highest ratios being 18·4 in the Narbudda and 18·3 in the Secunderabad districts, an increase of 5·5 and 6·1 respectively. In the preceding year the highest admission ratios occurred in the Mandalay, Madras and Sind districts in the order named. The lowest ratio was 3·7, which occurred in both the Southern and Rangoon districts, a decline of 10·6 and 1·2 respectively; the next lowest being 7·1, in the Mhow district, and 7·4 in the Rawal Pindi district, decreases of 3·8 and 1·5 respectively. Conjunctivitis was, as usual, the principal cause of admission, 511 cases of that disease being recorded, while of the other admissions, 55 were due to keratitis, 35 to iritis, 22 to stye, 21 to blepharitis, 15 to myopia and 14 to hypermetropia.

Diseases of other Organs of Special Sense.—These were the cause of 960 admissions and of 56·37 men being constantly sick, equal to ratios of 14·9 and ·87 per 1,000 respectively. The admission rate was 1·5 lower than that of the previous year but only ·1 less than the average rate of the preceding ten years, while the constantly sick rate was ·07 lower and ·09 higher respectively in the two comparisons. There were no deaths. The Sind district again leads with 42·9 per 1,000, a decrease of 21·7 on the rate of the previous year. Nagpur (which had the third lowest ratio in 1896), with 29·4 and Bundelkhand with 24·6 come next in order, being respectively 22·7 and 4·5 higher than the previous year's rates. The lowest admission ratios were 6·1 in Secunderabad (which stood lowest but one with 5·4 in 1896), 8·7 in Rawal Pindi, a decrease of 4·8, and 9·0 in Bangalore (which had the lowest ratio in 1896), an increase of 4·4. Of the cases included under this head 19 were nasal affections, the rest being cases of aural disease, chiefly inflammation of the external meatus, for which there were 723 admissions. There were 80 cases of inflammation (12 suppurative) of the middle ear and 97 cases of perforation of the membrana tympani.

Diseases of the Circulatory System caused 728 admissions and 39 deaths (one being the death of an invalid), equal to ratios of 11·3 and ·60 per 1,000 respectively. The admission rate is 1·5 and 1·0 respectively higher than the previous year's and decennial average rates, while that of mortality is ·07 and ·21 higher in both comparisons. There were 71·86 men constantly sick from these affections, being in the ratio of 1·11, as compared with ·91 and 1·06 respectively for 1896, and the decennial average. The highest admission rate, 41·7 per 1,000, occurred, as in the preceding year, in the Bombay district, but it is 10·5 lower; the next highest being 21·7 in the Rohilkhand district (which had the third highest ratio in the preceding year), a decrease of 1·7,

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and 18·4 in the Sind district, which stood second in the previous year with 23·6. The lowest ratio was 1·1 in the Nagpur district, a decrease of 1·8, the next lowest being 3·7 in the Poona district (which was also next lowest in 1896), an increase of 1·2, and 4·6 in the Peshawar district, a decline of 1·3. The Allahabad district had the highest rate of mortality, 1·78 per 1,000, an increase of ·98, followed by 1·75 in the Peshawar district (where there was no death in the previous year) and 1·53 in the Deesa district (which also stood third highest in 1896 with 1·66). Disordered action of the heart was, as usual, the cause of the majority of the admissions, 395 being recorded for that affection. Amongst the remaining admissions there were 178 cases of valvular disease of the heart, 56 of varix, 28 of thrombosis of veins, 15 of phlebitis and 12 of aneurysm of arteries. The deaths were 15 from valvular disease of the heart, 6 each from fatty degeneration of the muscular substance of the heart and aneurysm of arteries, 4 from syncope, and 1 each from hypertrophy of the heart, dilatation of the heart, excessive growth of fat, rupture of the heart, thrombus in the heart, thrombosis and embolism. The death of the invalid was due to aneurysm of aorta.

Diseases of the Respiratory System were the cause of 1,616 admissions and 38 deaths, giving the ratios of 25·0 and ·59 per 1,000, respectively. The former is lower than the rate of the previous year, and the average rate of the preceding ten years by 6·3 and 8·9, and the latter by ·24 and ·33 respectively. The number of men constantly inefficient was 103·73, being in the ratio of 1·61, as compared with 1·86 in the year before and 1·92, the decennial average rate. The highest admission rate was 53·7 per 1,000, in the Deesa district, which also stood highest in 1896 with 57·9, the next highest rates being 37·5 each in the Rohilkhand and Mandalay districts, an increase of ·4 and 15·2 respectively, and 37·0 in the Rawal Pindi district, an increase of ·9 only. The lowest rate of admission, 9·4, occurred in the Aden district (which stood the lowest but one in 1896 with 14·6), the next lowest being 14·4 in the Bangalore district, a decrease of 4·1, and 15·3 in the Oudh district, a decrease of 10·3. Mortality was highest in the Peshawar district, the ratio being 2·80 as compared with 1·73 in the preceding year, the next highest being 1·32 in the Bundelkhand district, an increase of ·48, and 1·12 in the Rawal Pindi district, a decrease of ·29. Of the 1,616 admissions, 1,213 were for bronchitis, 201 for pneumonia, 97 for pleurisy, 36 for laryngitis, 26 for spasmodic asthma, and 14 for phthisis, while of the 38 deaths 33 were from pneumonia, 2 from pleurisy and 1 each from abscess of the lung, phthisis and empyema.

Diseases of the Digestive System caused 7,807 admissions into hospital and 121 deaths, 5 of which occurred in invalids who had left the command, the equivalent ratios being 121·0 per 1,000 for the former and 1·187 for the latter, as compared with 120·5 and 1·53 respectively in the previous year and 127·0 and 1·78, the corresponding average rates for the preceding ten years. The constant inefficiency on account of these diseases was 375·21 men, equal to 5·81 per 1,000, against 5·45, the ratio both for 1896 and for the ten years' average. The ratio of prevalence was highest in the Rohilkhand district, 172·5 per 1,000, an increase of 28·8 on the rate of the year before, the next highest being 171·0 in the Mhow district (40·6 above the previous year's rate), and 167·2 in the Deesa district (an increase of 18·2). The lowest ratio, 70·2, was in the Aden district, a decrease of 44·8, the next lowest being 70·3 in the Southern district (which was second highest in the preceding year with 168·6), and 89·3 in the Nagpur district (which was the lowest in the year previous with 54·5). The mortality rate was highest in the Presidency district, 6·16 as compared with 3·69, the second highest ratio in the preceding year, the next highest mortality rate, 6·13, being observed in the Deesa district, where there was no death in the year before, followed by 3·68 in the Narbudda district, which had the highest death rate, 4·56, in the previous year. No death occurred in the Madras district. Amongst other districts the lowest death rate, ·52, was in the Mandalay district, a decrease of ·52, the next lowest being ·68 in the Sind district, a decline of 1·34, and ·78 in the Sirhind district, a decrease of 1·92. The principal causes of admission were affections of the mouth and throat, 2,502 cases, hepatic disorders 1,725 (including 668 cases of congestion of liver, 490 of hepatitis, 356 of jaundice and 145 of abscess of liver), diarrhœa 1,661,

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indigestion 708, diseases of rectum and anus 491 (including 411 of piles), colic 309, inflammation of intestines 170, hernia 96, and inflammation and ulceration of stomach 75. The deaths comprised 86 from abscess of liver, 9 from peritonitis, 5 from typhlitis, 3 each from diarrhœa and cirrhosis of liver, 2 each from gastritis, enteritis and volvulus, and 1 each from perforating ulcer of stomach, perforation of intestines, periproctitis and yellow atrophy of liver. The deaths of invalids were, from abscess of liver 3, and from fistula of intestine and typhlitis 1 each. Abstract XIX exhibits the prevalence of, and mortality from, diarrhœa and hepatic diseases in the several districts, and Abstract XX the prevalence of and mortality from these diseases in each quarter of the year. The ratio of admission for diarrhœa was 25·7 per 1,000, against 20·1 in the preceding year, and the mortality rate ·05 against ·01. The greatest prevalence was in the Allahabad district, 51·2, an increase of 30·3 on that of the previous year, the next highest being 49·8 in the Peshawar district (34·2 increase), and 43·2 in the Mhow district (15·3 increase). The Madras district, which had the third lowest ratio (4·5) in 1896, gave the lowest ratio, 2·7 per 1,000, in the year under review, the next lowest being 3·3 in the Belgaum district, against *nil* in the previous year, and 3·6 in the Bangalore district (a decrease of 4·6). The only large decrease occurred in the Sind district, which had the highest admission rate in the previous year, the ratio, 18·4, showing a decrease of 18·6. The deaths occurred in the Rawal Pindi, Peshawar and Poona districts, which record one death each from diarrhœa. As in the preceding year, the prevalence of this disease was greatest in the third quarter of the year, when the admission rate was 8·9 per 1,000, followed by 8·5 in the fourth, 5·3 in the second and 3·7 in the first quarter. One of the three deaths occurred in the first quarter and the remaining two in the fourth quarter. The ratio of admission for hepatic diseases was 20·5, and that of mortality 1·38 per 1,000, as compared with 23·5 and 1·28 respectively in the previous year. The rate of prevalence was highest in the Bangalore district, 51·6, an increase of 21·4, the next highest being 50·6 in the Deesa district (increase of 19·1), and 34·9 in the Narbudda district (decrease of 9·9). In the preceding year the three highest ratios were in the Madras, Mandalay and Rangoon districts in the order named. The lowest ratio of admission for hepatic affections was in the Nagpur district, 4·4, a decrease of 15·7, the next lowest being 4·7 in the Aden district, a decrease of 36·2, and 7·8 in the Quetta district, which stood the lowest in the previous year with 6·9. Mortality from hepatic affections was highest in the Presidency district, the ratio being 5·07 (as compared with 3·35 in 1896, when it stood third), the next highest mortality rate being 4·60 in Deesa district, where there was no death in the previous year, followed by 3·68 in the Narbudda district, which had the highest ratio, 4·56, in the preceding year. In the Madras district there was no death, and the next lowest mortality rates were ·52 in the Mandalay district, against 1·01 in the year before, ·67 in the Lahore district, which with ·20 was the lowest in the previous year, and ·68 in the Sind district, a decrease of 1·34. With regard to the seasonal prevalence of hepatic disorders, the highest admission ratio occurred in the second quarter of the year, namely, 5·4 per 1,000, and this is followed by admission ratios of 5·3 each in the third and fourth quarter, and 4·5 in the first quarter. The deaths were distributed as follows, 16, or ·23 per 1,000 of strength in the first quarter, 19, or ·27 per 1,000 in the second, 29, or ·46 per 1,000 in the third, and 25 or ·45 per 1,000, in the fourth quarter.

Diseases of the Lymphatic System.—2,057 admissions and 3 deaths are recorded, giving an admission rate of 31·9, which is an increase of only ·9 on that of the preceding year but a decline of ·4 as compared with the previous ten years' average rate, and a death rate of ·05 per 1,000, which is ·04 and ·02 higher than the previous year's and decennial average rates. There were 254·71 men constantly inefficient, representing a ratio of 3·95, which is ·46 and ·38 respectively higher in the two comparisons. The highest admission ratio was 70·8 in the Nagpur district, higher by 44·0 than in 1896, the two next highest ratios being 56·1 and 54·3, increases of 21·1 and 28·3, in the Narbudda and Madras districts respectively. The lowest rate, 18·7, occurred in the Aden district, which stood last but one in 1896 with 15·6, the next lowest being 19·6 in the Peshawar district (as compared with 13·1, the lowest in the preceding year), and 19·9 in the Rohilkhand district, a decline of 13·0. Of the admissions, 1,992 were due to diseases of the lymphatic vessels and glands, 57 to diseases of the spleen and 7 to diseases of the thyroid body. The deaths were due to abscess of the spleen (1 death), hypertrophy of the spleen (1), and suppuration of the lymph glands and vessels (1), and they occurred in the Oudh, Rawal Pindi and Nagpur districts (1 in each).

Diseases of the Urinary System.—There were 126 admissions and 13 deaths, the admission rate being 2·0 per 1,000, or ·2 lower than that for the previous year and identical with the average rate of the preceding ten years. The death rate was ·20, or lower than in 1896 by ·01, but ·02 above the decennial average rate. The highest ratio of admission, 4·6, was in the Peshawar district, which was the lowest in 1896 with ·7, the next highest being 4·0, in the Poona district, as compared with 3·6 in 1896 and 3·4 in the Sind district (an increase of 1·4). The highest mortality rates were ·92, ·88 and ·67, in the Narbudda, Bundelkhand and Lahore districts respectively, as compared with *nil*, ·42 and *nil* in the preceding year. The admissions were chiefly for nephritis, 61 cases being recorded, of which 10 proved fatal. Inflammation of the bladder caused 26 admissions, incontinence of urine 12 admissions, and granular kidney 7 admissions and 3 deaths.

Diseases of the Generative System.—The admissions for these affections amounted to 6,435 and there was one death, the admission ratio being 99·7, as compared with 78·8 in the previous year and 88·2, the average for the preceding ten years. 508·55 men were constantly non-effective, giving a ratio of 7·88, which is 1·89 and 1·69 respectively higher than that of the year before and the decennial average rate. The Nagpur district, which stood highest with 303·1 in 1896, had again the highest admission rate with 303·9 per 1,000, the Deesa district (which had the third highest ratio, 220·2 in the previous year) coming next with 263·8, the Quetta district being third with 185·1, an increase of 62·9. The lowest rate of prevalence was, as in the year before, in the Belgaum district, 32·7 (an increase of 18·7), the next lowest being 36·1 and 48·5 in the Rawal Pindi and Rohilkhand districts, increases of 16·9 and 26·2 respectively. The largest decreases, 139·9 and 101·0, are observed in the Sind and Narbudda districts, which were fourth and second highest in the preceding year with 205·9 and 263·7 respectively. Soft chancre accounted for no fewer than 5,500 of the admissions, and among the remainder, the chief causes of sickness were orchitis (477 admissions), balanitis (168), ulcer of penis (76), and stricture of urethra (59). The death was due to gangrene of penis.

Diseases of the Organs of Locomotion.—There were 760 admissions and 3 deaths. The admission ratio was 11·8 per 1,000, which is ·6 and 3·7 higher respectively than the previous year's and average rates, and the death rate ·05, or ·02 higher than in both comparisons. There were 61·34 men constantly sick from these diseases, giving a ratio of ·95, or ·10 and ·33 higher than in the two comparisons. The admission rates of the several districts range from 3·7 in the Aden district, to 25·7 in the Rohilkhand district. The ratios of 13 districts exceeded those of the previous year, the greatest increase being 12·6 per 1,000 in the Rohilkhand district. Of the remaining districts the rate in Allahabad shows the greatest decrease, namely, 6·9. Synovitis caused 393 admissions, myalgia 138, and diseases of the bones 75. The deaths were due 1 each to caries of the bones, caries of the spine, and psoas abscess.

Diseases of the Connective Tissue.—There were 1,412 admissions for these diseases, the ratio, 21·9 per 1,000, being lower than in 1896 by 3·1 and than the ten years' average rate by only ·1. 70·17 men were constantly non-effective from these diseases, being in the ratio of 1·09, or lower than in the previous year by ·07, but higher than the decennial average rate by ·04. The three highest admission rates were 36·2, 31·3 and 31·2 in the Madras, Rangoon and Bundelkhand districts respectively, being higher than those of the previous year by 19·2, 4·2 and 4·4 while the three lowest admission rates, 13·0, 15·5 and 16·1, were in the Quetta, Poona and Peshawar districts, showing respectively a decline of 19·0, ·8 and 6·0, as compared with the corresponding ratios in the preceding year. There was no mortality under this head.

Diseases of the skin.—The admissions numbered 3,423 and there were 149·43 men constantly sick. The ratio of admission was 53·0 per 1,000,

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which is lower by 7·4 than that of the previous year and by 7·0 than the average rate, and the constantly sick rate 2·32, which is only fractionally lower in the two comparisons. The highest admission ratio, 141·1, was in the Deesa district, an increase of 18·6, the next highest being 104·8 and 92·6 respectively in the Sind and Nagpur districts (increases of 16·6 and 53·4). The lowest ratios were 28·2 in the Secunderabad district (decrease of 8·2), 30·1 in the Rawal Pindi and 31·6 in the Quetta districts (decreases of 9·5 and 2·5). Eczema (358), ulcers (559), boils (1,593), whitlow (290) and onychia (237) were the chief causes of admission, together accounting for 3,037 cases.

INJURIES.—The admission rate was 104·5 and the death rate 1·81 per 1,000, as compared with 105·2 and 1·58 in the previous year and with 105·7 and 2·10, the corresponding average ratios for the preceding ten years. The average number constantly sick was 323·33, equal to a ratio of 5·01 which is higher than in 1896 by ·23 and than the decennial average rate by ·24. The number of admissions for *general injuries* was 277, and the deaths amounted to 79 (including that of an invalid), as compared with 288 and 70 in the year before. The admissions included 153 cases of heat apoplexy, 76 of heat-stroke, 28 of sun-stroke, 10 of burns and scalds, 7 of multiple injury, and 1 each of lightning-stroke, suffocation from submersion and exhaustion. The deaths were 45 from heat apoplexy, 6 from heat-stroke, 3 each from multiple injury (1 suicidal) and suffocation from plugging of the air-passages with foreign substances, 1 from suffocation by compression of chest, and 21 from suffocation by submersion. 13 of the 21 deaths from the last named cause were accidental, 4 suicidal and 3 of doubtful origin, and one man who had been invalided home on account of abscess of liver was found to be missing on the morning of the 29th November, and it was presumed that he had fallen overboard. For *local injuries* there were 6,466 admissions and 38 deaths, the principal causes of the former being, as usual, contusions (1,594 cases), strains and sprains (1,757), other wounds (1,968) and abrasions (608), giving an aggregate of 5,927 admissions from these causes alone, while among the more important of the remaining cases there were 284 cases of fracture, 93 of dislocation, 59 of gunshot wounds and 47 of burns and scalds. The deaths comprised 11 from gunshot wounds (7 suicidal and 1 homicidal), 8 from fractures of skull, 7 from fractures of spine (1 suicidal), 5 from other wounds (4 suicidal and 1 homicidal, the latter being the case of a man who was severely wounded by dacoits in Mandalay), 3 from dislocation of spine, 1 each from rupture of heart, contusion and rupture of bladder, and 1 man was killed by falling from a horse. 2 men were killed in action from gunshot wounds.*

There were 17 cases of suicide as compared with 22 in 1896. 7 were due to gunshot wounds, 4 to suffocation from submersion, 3 to wound of throat, and 1 each to multiple injury, fracture of spine and punctured wound of heart. The following are recorded as presumed motives, or causes in six of the cases:—getting into trouble through a woman (1 case), hypochondriasis (1), insanity the result of malarial fever (1), depression caused by death of a younger brother (1), enteric fever (1), excessive drinking (1), disappointment in a love affair (1). In the remainder no motive could be assigned, and in 15 cases the verdict was that the acts were committed while temporarily insane.- One of the men was 21 years of age, one 22, two 23, four 24, one 25, one 26, one 28, one 30, one 33, one 34, one 35, one 38 and one 45 years of age. One was of 2 years' service, two of 3, two of 4, four of 5, one of 6, one of 7, one of 10, two of 11, one of 12, one of 14 and one of 31 years' service.

There were also 12 cases of self-inflicted injuries or attempts at suicide, of which 9 were wounds of throat and 1 of neck. 1 man attempted suicide by drowning (jumping into a river) and in 1 case the method of self-inflicted injury was unknown. In 3 cases the attempt was induced by drink (1 while suffering from delirium tremens), 1 was attributed to grievance in having been punished by his Commanding Officer, and 1 to an attempt at

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* These were men of the 4th Dragoon Guards who were on the march in connection with the North-West Frontier Force.

escaping trial by court-martial for a serious offence. In the remaining 7 cases no motive or cause could be discovered.

Poisons caused 51 admissions and 2 deaths, as compared with 34 admissions and 8 deaths in 1896. Of the admissions, the following are noted as causes:—swallowing an irritant drug (20 cases), arsenic (1), opium (1), chloroform (1), decayed or poisonous food (9), poisoned wounds (10), dog bite (3), horse bite (1), snake bite (1) and stings by poisonous fish (1), scorpion (1), centipede (1), and other stinging insect (1). One of the two deaths was due to partaking of decayed and poisonous food and the other to poisoning by choroform vapour, which occurred at Darjeeling in the month of October, during an operation for abscess of liver.

Surgical Operations.—446 operations are recorded for the year, of which 396 were primary and 50 secondary. Death followed 46 of the former and 12 of the latter. Two amputations of the thigh at lower third (1 for periostitis and 1 for tubercle of joint), 1 of amputation at the tarsometatarsal joint for contraction of tendons, and 1 of the arm for gun-shot wound, were successfully performed. Record of successful amputation of toes for various causes in 9 cases, of fingers for different causes in 4 cases, and of the thumb, in a case of compound dislocation, is also made. Death followed one case of amputation, namely, of fore-arm necessitated by a wound. Of 88 cases of abscess of liver and 4 of hepatitis operated upon, 49 ended fatally, 6 failed, 7 were under treatment at the end of the year, and 30 were successful. Of these 28 (including 3 of hepatitis) were treated by aspiration, with 13 deaths, 3 failures and 4 still under treatment; 2 by hepatotomy (both failures), 10 by incision (6 fatal), 48 by incision and drainage (28 fatal and 3 still under treatment) 3 by incision with resection of ribs (2 fatal), the remaining operation being an unsuccessful exploration in a case of hepatitis. Of the other operations successful removal of lymphatic glands in 29 cases of inflammation, and in 33 of suppuration, and 59 cases of circumcision for various causes may be mentioned.

Invaliding.—The number of men sent home as invalids was 2,258, being in the ratio of 34·99 per 1,000, which is higher by 7·10 than that of the preceding year and by 9·82 than the decennial average. Taking the invaliding in the different arms of the service as shown in Abstract XXVI it is found that the invaliding ratio in the Cavalry was 34·95, an increase of 12·00 over that of 1896, in the Artillery 37·86, an increase of 6·53, and in the Infantry 35·96, an increase of 6·97.

Tables showing the influence of age and length of service in the country, on sickness, mortality and invaliding have already been given, and it will be observed that the invaliding rate was highest, 56·37 per 1,000, among men over 40 years of age, and lowest in men under 20 years. In 1896 similar results obtained, when the ratio for men over 40 years was 46·63 and that of men under 20 years 14·48. Men of between 20 and 25 (who stood second in the previous year) again came second with 42·09, followed by men between 25 and 30 years with 30·51 (also third in the previous year with 25·27). Amongst men between 35 and 40, and 30 and 35 years the ratios were 28·02 and 21·95 respectively. In comparison with the ratios for the preceding year, those for the year under report show an increase in every quinquennial period, viz., 9·94 among men between 35 and 40 years of age, 9·74 among those over 40 years, 9·48 among men between 20 and 25 years of age, 5·24 and 3·40 among men between 25 and 30, and 30 and 35 years of age respectively; while the lowest increase, ·80, is among men of under 20 years of age. As regards the influence on invaliding of length of service in the country, the highest invaliding ratio, 44·16 per 1,000, occurred among men in their fourth year (third highest in 1896 with 27·21), the next highest ratios being 41·78, 36·53 and 33·07 among men in their third, second and fifth years' service respectively (second, highest and fourth highest in 1896). The next in order is 32·67 among men of over ten years' service, followed by 32·45 among men between 5 and 10 years' service, and 25·86 among men with less than one year's Indian service. As compared with the ratios of the previous year, the invaliding amongst men in their second year shows a decrease of 3·50 per 1,000, while all the others show increases

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amounting to 16·95 among men in their fourth year, 13·51 among those in their third, 9·95 among men with over ten years' service, 8·67 among men between 5 and 10 years, 7·61 among men in their fifth year, and 2·13 among men with less than one year's Indian service.

The principal cause of invaliding was secondary syphilis, which accounted for the invaliding home of 611 men, (as compared with 448 in 1896 and 321 in 1895), or a ratio of 9·47 per 1,000. Diseases of the circulatory system come next with 214 cases, (including 89 of valvular disease of the heart, 75 of disordered action of heart and 21 of varix), giving a ratio of 3·32. There were 179 men invalided for debility, a ratio of 2·77 ; 165 for malarial fevers, or a ratio of 2·56 ; 154 for diseases of the digestive system (including 41 cases of hepatitis, 31 of abscess of liver, 18 each of hernia and congestion of liver, and 10 of typhlitis) giving a ratio of 2·39 ; 153 for tubercular diseases (including 133 cases of tubercle of lungs) being in the ratio of 2·37 ; 156 for diseases of the nervous system or 2·42 (61 or ·95 being for nervous diseases and 95 or 1·47 for mental diseases), 80 for dysentery, a ratio of 1·24 ; 79 for diseases of the organs of locomotion (including 23 cases of synovitis) being in the ratio of 1·22 ; 78 for rheumatism or 1·21 ; 69 for diseases of other organs of special sense (including 38 cases of perforation of membrana tympani, 15 of deafness and 11 of inflammation of middle ear), giving a ratio of 1·07 ; 57 for local injuries (including 27 cases of fracture of bones) being in the ratio of ·88 ; 45 for gonorrhœa, or ·70 ; 42 for enteric fever, a ratio of ·65 ; 31 for diseases of the respiratory system or ·48 ; 30 for diseases of the eye, or ·46 ; and 21 for diseases of the lymphatic and glandular system (including 10 cases of inflammation of lymph vessels and glands) being in the ratio of ·32. Compared with the corresponding ratios of the previous year and the average of the preceding ten years an increase of 3·11 and 61·5 respectively is noted in the invaliding ratio of secondary syphilis ; of 1·08 and ·69 under diseases of the circulatory system, of ·63 and ·56 under malarial fevers ; of ·60 and ·45 under diseases of the digestive system ; of ·37 and ·77 under tubercular diseases ; of ·42 and ·25 under mental diseases ; of ·09 and ·20 under dysentery ; of ·18 and ·47 under diseases of the organs of locomotion ; of ·50 and ·27 under rheumatism ; of ·03 and ·21 under diseases of other organs of special sense ; of ·37 and ·53 under gonorrhœa ; and of ·14 and ·36 under enteric fever. The ratio for debility was ·15 higher than in 1896, but ·50 lower than the decennial average ; for local injuries ·04 higher and ·05 lower in the two comparisons ; for diseases of the respiratory system, ·08 more and ·14 less respectively ; and for diseases of the lymphatic system, ·02 higher in the former and ·08 lower in the latter comparison. Decreases of invaliding ratio occurred under nervous diseases (excluding mental diseases) of ·04 and ·09, and under eye diseases of ·14 and ·11 respectively as compared with the corresponding ratios in 1896 and with the decennial average.

There were 1,301 men discharged the service as medically unfit, equal to a ratio of 20·16 per 1,000, which is above the rate for 1896 and the decennial average rate by 7·68 and 6·92 per 1,000 respectively. The principal disabilities necessitating discharge were dysentery 9 cases, or ·14 per 1,000 ; malarial fevers 23, or ·35 per 1,000, tubercular diseases 105, or 1·63 per 1,000, secondary syphilis 356, or 5·52 per 1,000, debility 74, or 1·15 per 1,000, nervous affections 164, or 2·54 per 1,000 (including 97 or 1·50 per 1,000 of mental disorder), diseases of the circulatory system 178 (including 53 cases of disordered action of the heart), or 2·76 per 1,000, diseases of the digestive system 50, or ·77 per 1,000, diseases of the organs of locomotion 62, or ·96 per 1,000, and injuries 57, or ·86 per 1,000. In comparison with corresponding ratios for 1896, increase in ratio is observed principally in the following :—Secondary syphilis (3·62), diseases of the nervous system (1·13), diseases of the circulatory system (1·02), debility (·67), diseases of other organs of special sense (·39), injuries (·35), and diseases of the organs of locomotion (·34), while in no instance is there any notable decrease.

OFFICERS.—The average strength of officers for the year was 1,845, the number of attacks of illness 1,620, the number of deaths 37, and number invalided to England 145. The ratio of sickness was 878·0 per 1,000, that of death 20·05, and that of invaliding 78·59. Compared with the corresponding

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ratios in the previous year the admission ratio is 36·0 lower, but the mortality and invaliding ratios respectively 2·54 and 15·56 higher. Of *eruptive fevers* there were 23 cases, namely, 4 of small-pox (as compared with 11 in 1896), 1 of cow-pox, 5 of measles, 7 of rubella, 4 of scarlet fever, and 2 of dengue. Two mild cases of *plague* occurred at Poona. There were 20 cases of *influenza.* 64 cases of *enteric fever* occurred with 13 deaths, as compared with 62 and 14 respectively in the year before, and 31 officers were invalided to England on this account. The ratio of admissions for enteric fever to strength was 34·7 per 1,000, as compared with 31·0 in 1896, and with 31·8 per 1,000, the ratio among the non-commissioned officers and men during the year under report, while the ratio of deaths was 7·05, as compared with 7·00 in the preceding year, and 8·62, the death rate of the non-commissioned officers and men. The percentage of mortality to attack was 20·3, as compared with 22·6 in the previous year and 27·1 among the non-commissioned officers and men. The cases were distributed over 33 stations, namely, 5 cases and 1 death at Lucknow, 5 and no death at Quetta. 4 and 1 death at Agra, 3 and 1 death each at Secunderabad and Mhow, 3 and no death at Umballa, 2 and 1 death each at Peshawar, Wellington, Belgaum, Poona and Nasirabad, 2 each and no death at Fyzabad, Jhansi, Meerut and Rawal Pindi, 1 and 1 death each at Chakrata, Sialkot, and Karachi, 1 each and no death at Allahabad, Dinapore, Cawnpore, Bareilly, Chakrata, Dagshai, Kasauli, Amritsar, Dalhousie, Murree, Cherat, Bangalore, Rangoon, and Kirkee, and one death at Mian Mir in the case of an officer remaining under treatment from the year previous. There were also 6 cases admitted on the line of march. *Other continued fevers* gave a ratio of 65·6, being an increase of 12·6 on that of the preceding year, and one officer died while absent from his corps from undefined fever. There were 4 cases of *cholera*, 3 of which proved fatal. The same number of cases and deaths occurred in 1896. *Dysentery* caused 58 cases of illness and 2 deaths, equal to ratios of 31·4 and 1·08, against 32·5 and *nil* in the preceding year. *Malarial fevers*, including 383 cases of ague and 99 of remittent fever (2 fatal) gave a ratio of 261·2 per 1,000, being an increase of 40·1 over that of the preceding year. There were 2 cases of *tubercle of lung. Venereal diseases* furnished a ratio of 17·3, which is 2·8 higher than in 1896, while *parasitic diseases* gave 6 cases. *Rheumatism* and *debility* gave 24 and 31 cases respectively, the ratios, 13·0 and 16·8, being ·8 higher for debility, and 2·5 lower for rheumatism, than in 1896. There was 1 case each of mumps, sloughing phagedæna and anæmia. *Diseases of the nervous system* furnished 25 cases, being in the ratio of 13·5 as compared with 8·5 in the preceding year. The cases included 11 of neuralgia, 5 of nervous weakness, 2 of dementia, and 1 each of cerebral meningitis, hemiplegia, vertigo, headache, mania, melancholia, and delusional insanity. For *diseases of the eye* there were 11 cases, including 8 of conjunctivitis, and giving a ratio of 6·0, a decrease of 6·0 on that of the previous year. Eight cases were due to *diseases of the ear* and 4 to *diseases of the circulatory system.* Under the latter heading the death of an officer is recorded from fatty degeneration of the heart while absent from his corps. 23 cases were due to *diseases of the respiratory system*, 10 of which were cases of bronchitis, 5 of spasmodic asthma, 3 of laryngitis, 2 each of pneumonia and pleurisy, and 1 of tracheitis, the ratio, 12·5 per 1,000 being 21·0 lower than in 1896. *Diseases of the digestive system* furnished a ratio of 127·9 per 1,000. which is only ·2 lower than that of the previous year. Diarrhœa (68 cases), hepatic affections (58), throat affections (36), diseases of the stomach (25), and diseases of the intestines (25), were the principal causes of illness. There were 3 deaths from abscess of the liver, two being deaths of officers while absent from their corps, and one death each from enteritis, typhlitis, and congestion of the liver, the last being the death of an officer absent from his corps. There were 13 cases of affections of the *lymphatic vessels and glands*, 16 of the *urinary system* (with 1 death from acute nephritis), and 11 cases of diseases of the *generative system. Diseases of the organs of locomotion* furnished 38 cases (including 24 cases of synovitis) being in the ratio of 20·6 or 2·9 less than in 1896, and there were 28 cases of *diseases of the connective tissue.* The ratio for *diseases of the skin* was 49·3, and included 55 cases of boils, 12 of ulcers, and 5 each of eczema and whitlow. *Injuries* gave a ratio of sickness amounting to 131·7, or 17·9 less than in 1896. There were 76 cases of sprains and strains, 58 of contusions, 27 of other wounds, 26 of fracture, 19 of concussion of brain, 11 of dislocation and 10 of abrasions. Of 4 cases of gunshot wound, 2 were fatal and were self-inflicted, no motive or cause being assigned beyond temporary insanity. There were 3 cases of heat-stroke, 2 proving fatal. One officer, while absent from his corps, died from rupture of lungs, and 1 from falling accidentally over a cliff. There were 3 cases of gunshot wound in action,* one fatal. The causes of *invaliding* were enteric fever 31 cases, malarial fevers 30, diseases of the digestive system 18 (including 11 of hepatic affections), debility 12, injuries 10, dysentery 8, nervous diseases 8 (including 3 for mental disorders), diseases of the circulatory system 4, simple continued fever, diseases of the respiratory system and urinary diseases 3 each, small-pox, influenza, tubercle of lung, anæmia and diseases of the skin 2 each, and anthrax, rheumatism and synovitis, one case each.

WOMEN.—The average strength of women was 3,203; there were 2,461 cases of illness and 49 deaths. The admission rate was 768·3 per 1,000, and that of mortality 15·30, being 38·7 and 3·14 lower than the corresponding rates in the previous year. There were 18 cases of and 1 death from *eruptive fevers*, 11 (1 fatal) were cases of *small-pox*, as compared with 53 and 2 deaths in 1896, and there were 3 cases each of *measles* and *scarlet fever*, and 1 of *chicken-pox*. One case of *plague* occurred at Poona. *Influenza* caused 10 admissions (against 30 in 1896), being in the ratio of 3·1. For *enteric fever* there were 23 admissions and 3 deaths, against 27 and 11 respectively in the previous year. The admission rate, 7·2, is 1·1 lower than in the preceding year and the death rate ·94, is also lower by 2·44; 5 cases and 1 death occurred at Cherat, 2 cases and 1 death at Secunderabad, 3 and no death at Dagshai, 2 and no death at Barrackpore, 1 case each with no death at Allahabad, Jubbulpore, Saugor, Jhansi, Umballa, Dalhousie, Sialkot, Wellington, Kirkee and Mhow, and there was a fatal case at Murree. *Simple continued fever* cased 50 admissions, being in the ratio of 15·6 as compared with 18·4 in the previous year. There were 2 fatal cases of *cholera*, 1 each at Sitapur and Deolali. *Dysentery* furnished 70 admissions, equal to a ratio of 21·9, an increase of 3·8 on the ratio for 1896; there were 3 deaths from this disease. Of 555 cases of *malarial fevers* 523 were due to ague and 32 to remittent fever, the ratio of admissions, 173·3, being higher than the previous year's rate by 36·2. There were 3 deaths from remittent fever and 1 from ague. Under *septic diseases* are recorded 4 cases of puerperal septicæmia, 3 of which proved fatal, 2 of puerperal pyæmia and 5 of erysipelas. There were 22 admissions and 4 deaths for *tubercle of lung* as compared with 14 and 4 deaths in the previous year, the ratios 6·9 and 1·25 being respectively 2·3 and ·02 higher. There were 3 admissions for *secondary syphilis*, 6 for *tænia solium* and 1 for *delirium tremens*; 37 admissions are recorded for *rheumatism*, including 4 cases of rheumatic fever, the ratio 11·6 showing an increase of 1·5; while for *debility* there were 805 admissions, equal to a ratio of 251·3, a decrease of 5·0. *Anæmia* gave 45 admissions, or a ratio of 14·0, as compared with 22·4 in 1896, and one death occurred from this disease. Under *other general diseases*, (excluding anæmia) are included 8 cases of mumps, 2 of cyst, 1 each of hæmophilia, diabetes mellitus, premature birth, and fibroma, and a fatal case of epithelioma. Under local diseases, *diseases of the nervous system* furnished 55 cases, as compared with 61 in the preceding year, and included 23 of hysteria, 15 of neuralgia, 7 of epilepsy, 2 of cerebral meningitis and 1 each of multiple neuritis, pachymeningitis, apoplexy, hemiplegia, chorea, mania, puerperal mania and dementia: 4 deaths occurred, as compared with 6 in 1896, namely, 2 from cerebral meningitis and 1 each from pachymeningitis and apoplexy. *Diseases of the eye* gave 41 cases 36 being cases of conjunctivitis. There were 5 cases of inflammation of the external ear, and a fatal case of suppurative inflammation of the middle ear. *Diseases of the circulatory system* gave 13 admissions and 5 deaths, as compared with 17 cases and 4 deaths in 1896. The deaths were due to syncope, 3, and endocarditis and embolism, 1 each. *Diseases of the respiratory system*, with 50 admissions and 3 deaths, gave an

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* On the march in connection with the North-West Frontier Force.

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admission rate of 15·6 and a mortality rate of ·94 per 1,000, as compared with 27·7 and ·92 respectively in the preceding year. The cases included 44 of bronchitis, 5 of pneumonia with 3 deaths, and 1 of phthisis. *Diseases of the digestive system* accounted for 228 admissions and 6 deaths, being in the ratio of 71·2 and 1·87 per 1,000, or 25·0 and ·90 lower than the corresponding ratios for 1896. The principal causes of admission were indigestion, 52 cases, diseases of the throat and mouth, 43, diarrhœa, 42, hepatic diseases, 31 (16 being congestion of the liver) and colic, 26. The deaths were due to gastritis and acute yellow atrophy of the liver, 2 each, and inflammation of intestines and hepatitis, 1 each. *Diseases of the lymphatic system* furnished 12 cases and that of the urinary system 9 cases. There were 279 cases and 3 deaths recorded under *diseases of the generative system*, the ratios being respectively 87·1 and ·94 per 1,000, the former lower by 1·4 and the latter higher by ·63 than in the preceding year. The causes of admissions were, as usual, numerous, the largest number of cases being for abortion, 86, metritis 25, menorrhagia 18, and inflammation of the ovary 17. The deaths were due to hæmorrhage from uterus, hæmorrhage from placenta prævia, and sudden death after delivery 1 death each. There were 8 cases each under *diseases of the organs of locomotion* and of the *connective tissue*, and 42 cases of *skin diseases*. Of the 32 cases returned under *injuries* may be mentioned 3 fatal cases of heat apoplexy and 1 fatal case each from heat-stroke and suffocation from submersion. The last was that of a woman who committed suicide by jumping down a well with her infant in her arms during a fit of temporary insanity.

CHILDREN.—The average strength was 5,744, the number admitted 3,286 and the deaths 290. The ratio of admission, therefore, was 572·1 and that of mortality 50·49 per 1,000, the former being lower by 1·5 and the latter higher by 4·89 than the corresponding ratios in the previous year. *Eruptive fevers* caused 279 admissions and 8 deaths, as compared with 344 admissions and 10 deaths in 1896; the ratio of admission being 48·6, and that of mortality 1·39, or 10·8 and ·34 lower than the corresponding ratios of the preceding year. 172 of the cases with 7 deaths were due to *measles*, 5 with 1 death to *small-pox*, 76 to *chicken-pox*, 22 to *rubella* and 4 to *scarlet fever*. One fatal case of *plague* occurred at Karachi. There were 23 cases of *influenza* against 10 in 1896, and one fatal case of *diphtheria*, as compared with 5 admissions and 3 deaths in the previous year. *Enteric fever* caused 36 admissions and 2 deaths as compared with 37 and 5 in the preceding year. They were distributed as follows :—at Kirkee 8 cases and 1 death, at Ranikhet 1 fatal case, at Agra 5, at Cherat 3 at Bareilly, Rangoon and Mhow 2 each, and at Allahabad, Jhansi, Chakrata, Jutogh, Mian Mir, Dalhousie, Sialkot, Gharial, Murree, Wellington, Bangalore, Belgaum and Bombay 1 each. *Simple continued fever* furnished 124 admissions and 5 deaths, as compared with 162 cases and 4 deaths in 1896, and *cholera* 13 cases with 5 deaths against *nil* the year before. For *dysentery* there were 91 admissions and 14 deaths against 77 cases and 12 deaths in the previous year. *Malarial fevers* gave an admission rate of 119·9 and a death rate of 3·48 per 1,000, being higher by 18·2 and ·54 respectively than in the preceding year. The cases were 613 of ague with 13 deaths and 76 of remittent fever with 7 deaths. *Erysipelas* accounted for 2 admissions against 2 cases and 1 death in the year before, and there were 15 cases with 13 deaths under *tubercular diseases* as compared with 15 cases and 6 deaths in 1896. There were 7 cases with 2 deaths due to inherited *syphilis*, and a fatal case of *hydrophobia* which occurred at Meerut. The child was bitten severely in the wrist by a pariah dog six weeks before admission into hospital on the 1st August. He seemed out of sorts about a week before admission and on the day he was admitted he was unable to swallow anything, was extremely nervous and had a spasmodic catching of the breath; these symptoms increased rapidly in intensity and he died the following morning; the old wound did not inflame, but pain was complained of in the bitten arm. There were 34 cases of *parasitic diseases*, including 10 cases of ascaris lumbricoides, 9 of tænia solium and 6 of oidium albicans. There was a fatal case of *scurvy* and 3 admissions for *rheumatism* (including 1 of rheumatic fever) against 10 cases in the preceding year. *Debility* furnished 256 cases with 15 deaths, giving a ratio of 44·6 and 2·61 respectively, which

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are less than in 1896 by 5·1 and 3·78 respectively. Under *other general diseases* 128 admissions and 26 deaths are returned, the cases being 25 with 23 deaths from immaturity at birth, 5 with 1 death from congenital malformations, and 14 with 1 death from whooping cough. Of the remaining admissions 45 were due to mumps, 30 to anæmia, 4 to rickets, and 1 each to cyst, lipoma, purpura and diabetes insipidus. Among local diseases, affections of the *nervous system* caused 50 admissions and 33 deaths, as compared with 73 and 44 respectively in the year before. 31 of the admissions with 25 deaths were due to infantile convulsions, 6 (5 fatal) to cerebral meningitis, 3 (all fatal) to internal hydrocephalus, 4 to laryngismus stridulus, 3 to epilepsy, and 1 each to anterior poliomyelitis, chorea and neuralgia. *Diseases of the eye* with 246 admissions give an admission ratio of 42·8 per 1,000, or 14·0 higher than in 1896. All but 2 were cases of conjunctivitis. There were 14 admissions for inflammation of the external *ear*, 2 (1 fatal) for valvular disease of *heart*, and 2 fatal cases of syncope. For *diseases of the respiratory system* there were 390 admissions and 30 deaths giving ratios of 67·9 and 5·40 per 1,000, as compared with 76·5 and 4·15 respectively in 1896. 351 of the admissions were cases of bronchitis, 19 pneumonia, 10 croup, 5 broncho-pneumonia, 2 each laryngitis and phthisis, and 1 spasmodic asthma. The deaths were 19 from bronchitis, 5 from pneumonia and 2 each from croup, laryngitis and broncho-pneumonia, and 1 from œdema of glottis. The ratio of admission for *diseases of the digestive system* was 101·8 as against 114·7 in the year preceding, and the death rate 18·11, an increase of 3·08. Of the 585 admissions and 104 deaths under this head 240 were cases of diarrhœa with 45 deaths, 184 disorders of dentition with 45 deaths, 54 throat affections with 1 death, 40 inflammation of intestines with 11 deaths, 7 gastritis with 1 death, and a fatal case of peritonitis. There were also 20 cases recorded as indigestion. *Diseases of the lymphatic system* caused 13 admissions, those of the *urinary system* 4, *generative system* 7 and *organs of locomotion* 12, while *diseases of the connective tissue* furnished 39 cases with 2 deaths. For *diseases of thes kin* there were 109 admissions, which include 43 of eczema and 37 of boils. The only cases that may be mentioned under *injuries* are, 1 death each from sun-stroke, heat-apoplexy, burns and scalds and suffocation from submersion. The last was the case of the child already referred to whose mother jumped down a well with it in her arms.

SANITARY CONDITIONS.

BENGAL COMMAND.

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The Principal Medical Officer, Surgeon-Major-General T. Walsh, remarks generally with regard to the Command that the health of the British troops was not good. Malarial fevers and venereal diseases were the principal causes of inefficiency, while enteric fever, which accounted for no less than 45 per cent. of the total deaths, dysentery, hepatic abscess, cholera, and heat apoplexy were the main causes of mortality.

The prophylactic exhibition of quinine at stations such as Barrackpore, Nowgong, and Delhi, where malarial fevers were most prevalent, was not generally effective in warding off attacks, but the fact that the deaths were very few in proportion to the number of admissions lends itself to the inference that the severity of the disease was reduced by the drug.

The introduction of the new cantonment rules will, it is anticipated, check the ravages of venereal disease, which was very prevalent throughout the Command.

The Epidemic Diseases Act proved salutary in closing the door to plague. Special precautionary measures were adopted and great attention was paid to sanitary cleanliness in every cantonment; and only one case of plague occurred, viz., in a sepoy of the Bombay Regiment stationed at Jubbulpore, who imported the disease from Bombay. Quarantine segregation and disinfection checked the spread of the malady.

It speaks well for the sanitation of the cantonments generally, that though cholera was often prevalent among the surrounding native population, there were practically but three outbreaks among the troops, viz., at Sitapur, Muttra, and Lucknow. Small-pox also, which is common among the natives, furnished only a few admissions. Vaccination and re-vaccination with calf lymph, preserved with lanoline or glycerine, was satisfactorily carried out.

On the other hand the sanitary state of several cantonments, more particularly Agra, Benares, Jhansi, Chakrata, Barrackpore, Lucknow, Meerut, Allahabad, and Jubbulpore, if tested by the incidence of enteric fever, must be regarded as unsatisfactory. Every endeavour has been, and is being made, to improve the sanitary condition of the supplies and the surroundings of the soldier, special attention being paid to the purity of the water and milk supplies and to the cleanliness of cook-houses, cook's latrines, etc. The result has not been encouraging, for enteric fever continues to increase. The better sanitation of the surroundings of the native, with whom the soldier comes in contact in barracks or in the neighbouring bazars, the more general destruction by fire of all excreta, and protective vaccination of all young soldiers against enteric fever, might be attempted with a view to checking the incidence of the disease.

The following notes are made regarding the sanitary conditions in the individual stations of the Command:—

PRESIDENCY DISTRICT.—*Fort William* enjoyed an immunity from enteric fever throughout the year. The sanitary conditions are much the same as recorded in the report for 1896, the pail depôt scheme for the disposal of the fort sewage, though sanctioned, not yet having been taken in hand. The buildings in the fort escaped uninjured by the earthquake of the 12th June, which did much damage in the civil town. The accommodation has been sufficient, but a re-distribution of the men is necessary to prevent overcrowding. The quarters of the Army Hospital Corps men are

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said to be unsuitable, and there are no quarters for the hospital store-keeper's establishment, the washermen, or for the servants of the assistant surgeons. Isolation wards are also needed, and estimates have been prepared for buildings for each of the above items. A Donaldson furnace destructor for the destruction of the evacuations of enteric patients is at present under trial.

Dum Dum.—There was no case of enteric fever during the year. Ague was very prevalent in the last three months of the year and was attributed to the low lying marshy situation of the station. Rice cultivation is carried on in the vicinity, and the drainage, though considerably improved, is still defective. Quinine was issued as a prophylactic with beneficial results. The drainage of the bazars in cantonments, and a scheme for draining the marshes in the vicinity into the Salt Lakes are under the consideration of the Calcutta Corporation. The whole of the solid excreta from the barracks, hospital, officers' lines, commissariat lines, sadr bazar, and factory, is now burnt in the Henry Campion cinerator erected during the year. The liquid excreta and the slaughter-house refuse are buried in trenches and the land subsequently cultivated. The sewage from the bazars is pumped into a plantain garden, no other method of disposal being available until the masonry drains leading to the Salt Lakes are constructed. To reduce the number of private latrines in the bazars the Officer Commanding, Dum Dum, has been instructed to place every possible restriction on their use. The villages around cantonments, though in a perpetually insanitary state, are said to be so far removed from the barracks as not to affect the health of the troops. The District Principal Medical Officer, however, advocates a strict supervision over these villages.

Barrackpore.—The health of the garrison was bad. Enteric fever caused 23 admissions between January and September, August being the worst month. Ague, which was very prevalent after the rains, increased the sick rate and left a very large proportion of the men anæmic and debilitated. Dysentery (including cases associated with abscess of the liver) accounted for a high mortality ratio. The disease was of a malignant type and prevailed during the rains. The medical officer in charge is unable to account for the prevalence of enteric fever at the station. The dysentery he attributes, not to the water supply, but to the soil, which is waterlogged. Recourse was had to boiling as well as "pinking" the water, though the result was not reassuring, these methods having "signally failed to exert any influence on the epidemics of enteric fever and dysentery." The great sanitary defect of the station is the want of drainage. The question of improving the cantonment drainage generally is under consideration. Improvements in the Sadr bazar drainage, as distinct from the cantonment general system, are being carried out by the cantonment authorities, and should be completed within the next three years. The erection of a cinerator has been proposed for the destruction of the sewage. The building of the new hospital for British troops has not yet been commenced.

Fort Fulta, which is situated on the Hughli, 38 miles below Calcutta, was garrisoned by a small detachment of gunners and submarine miners from August to December. The surrounding country is cultivated with rice, and is malarious. The drinking water is obtained from Calcutta, the filtered municipal water being conveyed in iron tanks by steamer. A non-dieted hospital exists. There was no prevalence of any particular disease in the garrison.

Darjeeling.—The military station is built on a spur of the Sikkim Himalayas, and comprises the mountain battery barracks at Kalapahar (8,000 feet above the sea level), and the convalescent depôt at Jalapahar (7,700 feet), and Lebong (6,000 feet). The water supply is good and abundant, except in April and May, when the springs run short. At Lebong it is a pipe supply derived from the municipal works. At Jalapahar, it is brought up in mussacks from protected springs 200 feet below the ridge. No disease has been traceable to the water supply, but a scheme for the extension of the municipal supply to Jalapahar is under consideration. Rain-water is used for ablutionary purposes. The artillery barracks at Kalapahar are very cold in winter, and better warming arrangements are in contemplation. The depôt barracks at

Jalapahar, eight in number, vary in size and construction; the old pattern cottage barracks have a central dining hall and end dormitories; the new pattern barracks have enclosed wide verandahs for dining purposes. The strength of the depôt was increased from 286 to 456, the increase being met by using dining rooms as dormitories, but the necessary fittings and the bath and ablution rooms are deficient, and it has recently been ruled that in future the number of men sent to Jalapahar shall be limited to the number for whom proper barrack accommodation is provided. The buildings at Lebong are constructed on the latest standard plan and are excellent in every respect. The earthquake on the 12th June destroyed three barracks at Jalapahar, and there was consequently some overcrowding until the surplus men could be sent down. Owing to a landslip, one of the hospital blocks was considered unsafe. The hospital also suffered from the earthquake. The new hospital at Lebong was completed, but was not occupied during the year. It has accommodation for 50 beds. The lavatories and baths are insufficient, and those at the depôt in bad repair. They are cold and draughty, and the medical officer in charge recommends the erection of a central bath house with a hot water supply. The cinerator at Lebong has worked well, and a cinerator has now been sanctioned for Jalapahar. Funds have also been alloted for dhobies' houses and tanks. There was no enteric fever or cholera in the station during the year. The medical officer in charge advocates the depôt being utilized as a sanatorium in the cold weather, in place of invaliding men to England for change of climate, and gives it as his opinion that all cases of sickness except those of organic heart disease might be sent up.

ALLAHABAD DISTRICT.—*Allahabad.* The water is supplied by the municipality from the Jumna, and is conveyed in iron pipes to tanks and filter beds, whence it is distributed in pipes to the whole of Allahabad; it is ample, and chemically as well as bacteriologically of good quality. No sanitary defects were brought to notice. Enteric fever furnished 41 cases as against 97 in the previous year, and was the chief cause of mortality. There were two periods of prevalence, viz., January to May, and September to December. March was the worst month. The origin of the disease was not traced in any instance. There were also two fatal cases of cholera, one an officer, who died at a private hotel, where he resided, and the other a private of the Norfolk Regiment living in cantonments.

At *Fort Allahabad* the sanitary conditions were also generally satisfactory. In June, however, the water supply was stopped for three days owing to the unusually low level of the Jumna, and during this period the water for drinking and cooking purposes was taken from a well near the arsenal, which was first disinfected with permanganate of potassium. Cholera furnished 3 admissions with 1 death in August. The first case is believed to have contracted the disease in the bazars, where it was prevalent, the second by using the latrine visited by the first patient, and the third, who was a sick attendant on the previous cases, by neglecting the precautions as to personal cleanliness and disinfection. 8 men, 2 of whom died, were attacked with enteric fever, and the disease is said to have been contracted in the bazars. *Benares.*—The barracks for the most part are of an old pattern, and their replacement by new barracks is under consideration. The accommodation is ample, the ventilation sufficient, and the drainage good. Funds have been allotted for the construction of a masonry drain from the Sadr bazar to the Burna nullah, and the work is now being taken in hand. The water supply of the cantonments is from pukka wells. It is said to be ample, and is "considered of good quality." For the past two years, however, well water has not been used for drinking purposes. In its stead, water from the Municipal Waterworks is taken at considerable expense. The incidence of enteric fever has not, however, been affected by the alteration in the water supply, and the medical officer in charge notes that "though there are no apparent sanitary defects, the cantonment has acquired an evil reputation for enteric fever." Twelve per cent. of the British troops were attacked during the year. The disease appeared in March and continued until November. April and May were the worst months, August and September coming next. Cholera was very prevalent within a ten mile radius of the cantonment, but the British troops escaped without a case.

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Dinapore.—Enteric fever furnished 7 cases, 2 of which were fatal. The source of the infection was not traced. Cholera, though endemic, did not appear in the garrison, but there were 47 cases of diarrhœa. All water for drinking and cooking purposes was boiled. A Larymore boiler was used for the British Infantry, and a large iron cistern for the Royal Artillery. "Pinking" was also had recourse to after boiling. Wells are the source of supply, but, as the character of the wells varies greatly, only the water from the well in the station hospital compound, which is pronounced excellent in quality though somewhat hard, is used for drinking. A pump, in place of rope and bucket, has been recommended, and the installation of a Pasteur-Chamberland filter has been sanctioned. The new half-company barracks for the British Infantry are in process of construction, and when completed will be a great improvement. The hospital kitchen is dark, badly fitted, and difficult to keep clean. It requires new flooring, a new cooking range, and additional windows. The conservancy arrangements were the same as in 1896. There was an outbreak of conjunctivitis among the children of the 6th Field Battery, Royal Artillery, the disease being originally contracted from a native servant.

OUDH DISTRICT.—*Lucknow.* The sanitary conditions and arrangements of the barracks, hospitals, kitchens, &c., have been carefully attended to. Two new barrack rooms in the left European lines have been completed during the year. The milk and butter have been supplied regimentally, each corps having its own dairy under European management, and every endeavour has been made to prevent the possibility of the adulteration of these articles. The night soil is satisfactorily disposed of in the grass farm. The two defects at the station are the surface drainage and the water supply. With regard to the former, the disposal of waste water from the standposts and the washing wells in the native infantry lines has given much trouble, and it is now intended to dispose of this water in gardens and tree nurseries. The water supply is a pipe service from the municipal works, and, although abundant and chemically pure, is bacteriologically suspicious. Thus the enteric microbe was found in samples of water taken on three different occasions, viz., in January from the Municipal Waterworks, and in March and December from several standposts in cantonments. The source of the water is the river Goomti which is impure and it is believed that the water is contaminated at the intake. It is boiled and pinked with permanganate of potash, but notwithstanding these precautions, enteric fever prevailed, as in 1895, in a severe form, and accounted for 30 deaths, or 67 per cent. of the total deaths. The disease was present throughout the year, the periods of maximum prevalence being, as in former years, March to May, and October to December. It was wide spread and not limited to any particular corps or barracks. The women and children, however, escaped without a single case, and this immunity is difficult to explain. In consequence of the prevalence of enteric fever, a committee of military and civil officers assembled at Lucknow on the 12th and 14th February, and, while approving of the filtering arrangements at the filtering and distributing station of Aish Bagh, recommended the cleansing and disinfection of the clear water reservoirs and raised tanks, and the renewal of the surface materials of the filters, and in order to prevent the pollution of the river above the intake and to safeguard the supply at the intake, they further recommended the prohibition of the use of night soil for manuring the banks, the removal of the existing dhobies ghat, and the extension of the intake suction pipe to as near mid-stream as possible. A limited outbreak of cholera occurred in October in the 18th Hussars. One officer, 1 woman, 3 children and a private were attacked. The origin of the disease was not traced, and cholera had practically disappeared from the city and the neighbourhood at the time. In January there was a fatal case of diphtheria. An epidemic of influenza appeared in October and November, 5 cases of measles in April and October; and 8 cases of small-pox in February and March. The last named disease was very prevalent at the time, in both the cantonment and city. Dysentery, generally of a fairly mild type, prevailed to a greater extent than in previous years. The disease is endemic, and, though it was most prevalent in the cold weather, cases occurred throughout the year. Fevers of a continued or remittent type also

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prevailed, and are ascribed, some to malaria, and others to excessive heat. The general health of the prisoners in the military prison has been good. Remittent fever gave the largest number of admissions. There were 2 cases of enteric fever, and one of heat apoplexy. The enteric fever originated in the prison; the source of infection was not traced, but, in view of the earthen water goblets being possibly to blame, these vessels are now well boiled before issue from store and are renewed once a week. The general sanitation of the prison is good.

Fyzabad.—The ventilation and drainage is satisfactory. The drinking water is good and abundant, but rather hard. It is obtained from covered-in wells, pumped into a clean reservoir, and distributed to the different receptacles in buckets. The usual disinfection with potassium permanganate is carefully carried out. A scheme for a filtered water supply is in abeyance. There were no defects in the conservancy system. Three new urinals were constructed, and urinal troughs were provided for all urinals of British troops. No epidemic occurred during the year: 8 cases of enteric fever were contracted in the station. The cause was not traced in any instance. The greatest care is said to have been exercised with regard to the milk supply and management and cleanliness of the cook houses. The total deaths amounted to 10, 4 being due to heat apoplexy, 2 to enteric fever, and 1 to cholera. The last named disease is believed to have been imported. Dysentery and ague furnished fewer admissions than in 1896, and the general health of the troops, if venereal disease be excluded, has been good. *Cawnpore.*—The water supply, as in previous years, was taken from wells. It is good and abundant. Filter beds are in use, and potassium permanganate was used in the wells and water vessels. The amount of enteric fever (12 cases) was small in comparison with other stations. Ague shows a very large increase as compared with 1896. This was in part due to the fact that cases were sent back from the troops engaged in active operations on the North-West Frontier. The sanitation of the station generally is very good. A proposal to provide the cantonment with filtered municipal water is in abeyance, pending the decision of Government on the questions of reducing the overcrowding of the bazars and of demolishing certain insanitary settlements in the vicinity. The masonry latrines in the bazars are being replaced by movable iron ones.

Fatehgarh.—The water is from wells. The well which is used by the European detachment for drinking purposes, though covered, is considered to be insufficiently protected. Arrangements are being made to have the water raised by a hand pump and to improve the covering. The supply was sufficient, and, as a rule good, but the bacteriologist to the North-Western Provinces and Oudh Government reported the presence of the enteric microbe or "a microbe identical with that of enteric" in July in a sample drawn from a Macnamara filter tub, and in October in a sample drawn from one of the wells. There were only 5 cases of enteric fever, 3 of which were fatal during the year. In April a sample of milk was found contaminated with the enteric microbe. Strict orders were issued that all milk used by the troops was to be previously boiled. On no occasion was the enteric microbe found in the butter, samples of which were also examined. The sanitary condition and the food supplies generally were satisfactory: no disease, excepting venereal and malarial fevers, prevailed. The latter accounted for 32 per cent. of the total admissions. The prevalence of malarial fevers is attributed in part to the arrival of the detachment of the 1st East Surrey Regiment from Jhansi in August, and in part to the excessive rainfall of the year (44 inches as compared with 11 in 1896 and an average annual fall of 32 inches). Quinine as a prophylactic was used from 16th September to 20th November with good results. Cholera, though prevalent in the vicinity, did not attack the British troops, and of dysentery there were only 5 cases of a mild type.

Sitapur.—The health of the garrison during the year under review contrasts very unfavourably with that of the previous year. There was a severe outbreak of cholera in the Shropshire Light Infantry in September (10th to 17th), 67 cases (65 men, 1 woman, 1 child) and 41 deaths (40 men, 1 woman) occurred. All the companies furnished cases. A large proportion of the men first attacked belonged to the Army Temperance

Association. Samples of several articles found on the 10th September, 1897, in that Institute were forwarded to the Government Bacteriologist, who reported that in some of the articles, *e.g.*, cold infusion of tea, washing up water, &c., he had detected the cholera microbe, while others, *e.g.*, milk supplied from the regimental dairy and bread and confectionery obtained from a native baker in the regimental bazar, he described as "suspicious." The samples of barrack drinking water were pronounced germ free, but subsequently, on the occurrence of two cases in the station hospital, the germ was detected in a sample of water taken from the hospital well. The disease had been very prevalent in the surrounding villages for some time previous to its appearance among the troops, and it is believed to have been introduced through the free communication that existed, despite the strict precautions taken, between the native followers of the regiment and the inhabitants of the infected villages. Movement into sanitary camps was beneficial. All the drinking water, as well as the milk, was boiled, and the general cleanliness of the kitchens, of barracks and institutes, including the persons and clothing of the cooks, insisted on : the cooks, on enquiry, were stated to be, with but one or two exceptions, of very low caste, some even belonging to the sweeper caste, and it is noteworthy that one of the servants employed in the Army Temperance room, who was of the "Chamar" caste, to which the majority of the cooks belonged, was attacked with cholera before a single European suffered. In October 4 cases were returned under food poisoning; the men who suffered had taken a hearty supper of tinned fish and soon after experienced colicky pains with vomiting and purging. A practice said to be common among the men, viz., pouring vinegar on to the fish in the tin and leaving it standing in the tin for some time before consumption was prohibited. Five cases of enteric fever were admitted. Four of these were contracted at Sitapur between April and June, but the cause was not traced : all the cases were fatal. Three men suffered from small-pox of mild type in April. They are supposed to have contracted the disease from two prostitutes in the Sadr bazar, who had imported it from Thomsongung, 1½ miles distant, where small-pox was prevalent. Ague furnished only a small number of cases in excess of the number in 1896, and dysentery was practically non-existent. There was a considerable amount of intemperance; no less than 48 cases of drunkenness occurred in October on the return of the regiment from cholera camp. During the epidemic, restrictions had been placed on the supply of malt and other liquors. The general sanitary conditions of the cantonment are satisfactory. The water supply for the troops is drawn direct from a closed well by a pump, and the use of the filter tank, attached to the well, has been discontinued since the outbreak of cholera. The supply is good and sufficient, but the method of distribution to the barracks, cook-houses, &c., by means of galvanized buckets renders the water liable to contamination. All drinking and cooking water is now treated with potassium permanganate, and during the cholera epidemic it was boiled. The hospital, which was completed in 1896, is satisfactory, but the special ward and the hospital guard room, in both of which infectious diseases are treated, are old buildings, and are badly in need of repairs. A new family hospital was built during the year. All the food has to be cooked in the station hospital kitchen, and the medical officer is of opinion that a separate kitchen should be constructed. The rations and supplies generally have been on the whole of good quality. The milk and butter are derived from a regimental dairy, which is superintended by a soldier. The milk is boiled before issue. The bread and pastry for the Army Temperance Association have since September been obtained from a bakery in the civil lines, which is owned and supervised by a retired commissariat conductor, and supplies of any kind from native dealers have been restricted as far as possible. During the year, part of the sewage was burnt and part buried, but at the end of the year arrangements were made to incinerate all the sewage, both from the regimental lines and bazars, by the addition of a second furnace to the cinerator.

ROHILKHAND DISTRICT.—*Bareilly.* Owing to the frontier operations, troops were withdrawn, and the usual concentration for manœuvres was not held in the winter. The accommodation, which is ample in the hot weather, was

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as in previous years, supplemented by tents in the cold weather to the extent necessary to prevent crowding. No defects exist in the barracks or hospital, beyond those noted in the report for 1896. Several barracks were re-floored and re-roofed, and the hospital laundry and the contagious diseases huts re-built. The waste water from the lavatories is run on to a plot of ground behind each lavatory, planted with fast growing plants, such as lilies, &c. The drinking water supply is derived from three protected wells. It is good and sufficient, and attached to each well there is an iron tank, in which the water is stored. The tanks are protected from the sun by shelter sheds. An additional well for the British Infantry is being fitted with a pump and tank. The milk and butter for the hospital and for the Derbyshire Regiment have been obtained from the Government dairy. The Scottish Rifles had their own dairy, which also supplied the Royal Artillery. All the milk is boiled and locked tin cans are used for its distribution. The bread from the Commissariat and Regimental (Cameronian) bakeries was good. Great attention has been paid to the kitchens and to the supplies, and the several institutes have been well looked after. The water supply of the Outram and Roman Catholic Institutes, which, during 1896, was under suspicion, has during 1897 been much better, and the wells of both these institutions have been kept clean, and when not in use locked. Buckets are, however, used for drawing the water. Attention has also been paid to the ærated-water factories in the bazars. They are supervised, and the wells supplying water are treated with potassium permanganate. The conservancy arrangements for the troops are satisfactory, the Allahabad system of disposal being in force. The following defects have been brought to notice:—the faulty drainage of the British Infantry lines, the imperfect and primitive conservancy arrangements in the bazars, &c., the insanitary state of the slaughter houses and bakeries in the bazars, the want of proper arrangements for washing the clothes of Europeans and natives in cantonments, and the unsatisfactory conditions of the suburbs of the city and of a village near the Commissariat slaughter house. These defects are receiving due consideration, and are being remedied as funds become available. The general health of the troops, if venereal disease is excluded, was good. Ague of a mild type prevailed during the last four months of the year, and is attributed to the heavy rainfall after a year of drought. There were 48 cases of dysentery, and 32 of diarrhœa. Enteric fever shows a decrease in comparison with 1896, though the percentage of fatal cases was higher, *i.e.*, 16 admissions and 6 deaths as compared with 46 admissions and 13 deaths in 1896. The periods of prevalence were March, April, and December. The cause of the disease was not traced. There was cholera in the neighbourhood of cantonments, and the city was placed out of bounds. No case occurred in the garrison. Plague broke out at Hardwar and preparations were made for dealing with it in the event of its reaching Bareilly.

Shahjahanpur.—The water supply, which has been good and sufficient throughout the year, is derived from protected wells. Each well has had one ounce of potassium permanganate thrown down it weekly, and the water was never boiled before use. The milk and butter for barracks and hospital were obtained up to September from the mission dairy beyond cantonments. The quality of both was excellent. In September, cholera broke out among the mission children living near the dairy, and milk was then obtained from cows milked, under European supervision. The accommodation generally was sufficient and the rations good. The defective temporary barracks remain as described in the report for 1896. In connection with the hospital, the storekeeper's room has been enlarged to twice its original size and now affords ample accommodation. A small brick chamber for disinfecting clothes has been erected. Sanction has also been obtained to build a small hut for infectious diseases in the hospital compound. The drainage is good. The night soil is disposed of on the Allahabad system, which has worked most satisfactorily, except in the rains, when the trench system had to be adopted. The general health of the troops was very good. Venereal diseases were unfortunately common, and caused no less than 375 out of the 490 admissions during the year. Dysentery accounted for 9 admissions, and ague for 80, 60 of the latter being in September, October, and November. No case of cholera occurred in cantonments, though the disease was prevalent in the district during the autumn months. There were 2 cases of enteric fever, one of which was imported. Both proved fatal. The Medical Officer attributes the immunity of the garrison for the past two years in regard to enteric fever, "solely to "the rigid exclusion of the native element from the barracks, only those "who have actual employment are allowed within the precincts of the "barracks and in the regimental bazars there are no petty shop-keepers, etc. "Consequently no aerated waters, &c., other than those manufactured by "the regiment, are obtainable except in the native city, and in fact, the "soldier and the native are kept apart as far as possible. If it is impossible "to keep the men from going to the native city, the native at any rate can be "checked to a great extent, in a small cantonment, from frequenting the bar- "racks. This principle has been carried out here since a cholera scare which "originated at the latter end of 1895, and, it appears to me, with the "happiest results."

Naini Tal.—The hospital is old, not very suitable, and somewhat close to the bazar, but it meets ordinary requirements. There has been no crowding. The water supply from the municipal spring has been good and ample. All drinking water has been boiled. The milk also has been boiled before use, and the general sanitary conditions have been satisfactory. Cholera was prevalent from June to August in the civil settlement, which has a crowded and insanitary native population. The troops, however, escaped. Four cases of enteric fever occurred, viz., 1 in April, 2 in May, and 1 in June. The three earlier cases were imported; the case in June was from the band bungalow, which is in the civil station, where cases of enteric fever were occurring at the time. The medical officer reports that the improvement in the health of the convalescents sent up to the depôt from the plains was marked, but cases with a tendency to rheumatism are not benefited. The rainfall was over 120 inches, which was excessive, and some land-slips occurred on the hill sides.

Ranikhet.—There are two sets of barracks, one at Koompur and the other at the standing camp. The water supply for the former is derived from the Mint spring, and for the latter from the Chippra Spring. These springs are well protected and the quality of the water is excellent, but the quantity is not sufficient for all purposes in April, May, and June, and water for ablutionary purposes is drawn from impure springs and other sources. A scheme for increasing the supply of pure water at the station is under consideration. The distribution by mule pakhals was objected to, and metal drums have recently been taken into use in their place. The drinking and cooking water has been carefully "pinked." Provision is being made to carry out the extension of some of the main drains. The beef and mutton are of a poor quality, in consequence of the indifferent grazing ground. Milk and butter too are scarce, and the Cawnpore flour, from which the bread was made, was on several occasions found to be musty. The rations, however, including the bread, are reported to have been generally satisfactory, and such defects as have been brought to notice have been remedied as far as possible. Further, every endeavour has been made to keep illicit food and drink from being introduced into the lines. The sanitation of the kitchens has been well attended to. The Yorkshire Regiment started a dairy during the year under European supervision. It worked satisfactorily, though the prices of the milk and butter were high in comparison with the native supplies. This dairy was much appreciated, especially by the married people, and the Medical Officer is of opinion that its establishment has improved the general health of the troops in the station. The hospital has now a dairy of its own under European supervision. It is reported to have worked excellently throughout the year. The conservancy arrangements were satisfactory, the sewage being disposed over nine acres of cantonment land. The year under report has been, as regards sickness, very satisfactory indeed, and shows much improvement as compared with the previous year, with the exception of venereal disease, which is of a severe type, and which is on the increase both among Europeans and natives. Influenza (32 admissions) and diarrhœa (61 admissions) appeared in epidemic form in July and August, but there was no death from either of these diseases. There was no cholera. Only

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19 cases of enteric fever, with 3 deaths, occurred, as compared with 75 admissions and 11 deaths in 1896. Eleven of the cases were admitted into hospital either immediately or shortly after the arrival of the men in the station from the plains, and were clearly imported cases. The periods of greatest prevalence were March (5 cases), April (6), and August (4). As regards the origin of these cases, which arose in the station itself, the medical officer states that the cases were almost invariably traced to the Sadr bazar, though some men have attributed their illness to water or milk drunk in the jungles while out shooting. The sanitary condition of the several encamping grounds between Ranikhet and Kathgodam (the railway terminus, 49 miles distant) have been much improved since last year, and it is hoped they will be improved still more. The overcrowding of these camping grounds is still a matter for rectification, and more frequent inspection should be made by responsible officers during the periods of the year when they are used by the troops. The year was an exceptional one on account of the frontier expedition, which withdrew suddenly, and much before the usual period, almost the entire garrison from the station. The troops left at the very worst time of the year, and experienced on their downward journey to Bareilly the most incessant and heaviest rainfall that has been known for many years in these hills, but happily no sickness occurred during this period.

Chaubuttia lies near, and is included in one cantonment with Ranikhet. The barracks are situated on the ridge of Chaubuttia hill at an elevation of about 7,000 feet; the situation is excellent and generally well sheltered by trees. The barracks are mostly wooden huts with end walls of stone and with iron roofs. There are, however, two masonry blocks, which are much superior to the wooden huts. To prevent crowding tents were pitched, and the men living in tents were quite as healthy, even in the rains, as those in huts. The station hospital is still in process of erection. During the year the infectious ward, which was completed in 1896, and which had never been used for infectious or other cases, was utilized as a family hospital, while the men were treated in the old family hospital, a wooden hut with accommodation for 16 patients, and in tents. These arrangements answered well as a temporary measure. The hospital kitchens are satisfactory and clean, but the barrack kitchens are small and cramped, and the floors in a bad state of repair. The water supply is obtained from the "Forest Spring" situated about 1½ miles from cantonments. It is well protected, and discharges into a masonry reservoir, whence the water is run by pipes into galvanized iron tanks, from which it is distributed, under European supervision, in mule pakhals. The water is of good quality, is used for all purposes, and no means of purification, beyond the constant addition of potassium permanganate to the vessels of distribution and storage, were considered necessary. The milk is boiled before use. The cows are kept in the station, and milked under European supervision. The butter is obtained chiefly from the station hospital dairy at Ranikhet. The regimental bakery has been well managed and has supplied good bread, &[illegible] The regimental bazar, including the piggery, has been kept clean and in good sanitary condition. The supplies were satisfactory and the kitchens carefully looked after. The monsoon was heavy and prolonged. The general health of the troops, women, and children, throughout the season, which was shorter than usual, was excellent, with the exception of many and severe cases of venereal diseases among the men. The only case of enteric fever admitted was contracted at, or *en route* from, Shahjahanpur. Owing to the prevalence of plague at Bombay, a house to house inspection was made once a week, but no case of serious sickness was detected.

NARBUDDA DISTRICT.—*Jubbulpore.* The hospital accommodation was insufficient during the year, and an adjoining barrack had to be used for the sick. An officers' ward and a family hospital are needed. A site has been selected for the latter, and it is hoped that sanction will soon be obtained for its erection. The water supply is derived from the municipal works, situated 6 miles distant, and is conveyed by pipes to the various buildings in cantonments. The supply is abundant and of good quality, and potassium permanganate has been regularly added to the water in the storage tanks

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The drinking water has, in addition, been boiled. Milk and butter have been provided from the Commissariat Dairy Farm and the supplies are exceptionally good. Detailed attention has been paid to the sanitary state of the kitchens. One of the hospital kitchens was closed, its proximity to a latrine having been considered objectionable. The waste water from lavatories is run in open drains into nullahs or into plots planted with shrubs. The conservancy arrangements and the general sanitary condition of the cantonment has been satisfactory. The only defect brought to notice is the insanitary condition of two villages in cantonments. The demolition of these settlements was commenced in 1896, and is being carried out gradually. Ague was very prevalent and accounted for 40 per cent. of the total admissions Enteric fever and dysentery, (including inflammation and abscess of liver), were the chief causes of mortality. One fatal case of cholera occurred in an officer of the 17th Field Battery, Royal Artillery. Bacteriological examination revealed the presence of the cholera microbe in a sample of drinking water from the Royal Artillery mess, and in washings from an asparagus tin, the contents of which had been served at a private dinner at which the deceased and two others, who also suffered, were present about 50 hours before they were attacked. A few cases of ophthalmia of a mild type appeared among the children but are said not to have been due to insanitary causes.

Pachmarhi.—The medical officer in charge writes of this sanatorium that "the climate cannot be considered to be sufficiently bracing to be of much benefit to men suffering from debilitating diseases, but it is admirable for the gradual seasoning of the troops fresh from England, and is most suitable for the school of musketry. Sunstroke is unheard of, cholera never occurs, and enteric fever is rare, the cases of the latter disease being almost always imported from other stations." During the year under review there was but one case of enteric fever, which was admitted 6 days after arrival from Jubbulpore. No death occurred among the men, and with the exception of malarial fevers, no disease was prevalent. The year was thus decidedly a healthy one for the troops, even malarial fever being less prevalent than usual. The water supply is from a well in the centre of the barracks. The supply is good, abundant and well protected. Potassium permanganate was used weekly for purifying the well and the several vessels employed in the distribution and storage of the water. The buildings are intended to accommodate 250 men. Owing, however, to the appropriation of some of the rooms as coffee shop, reading room, &c., the number of men who can be accommodated is reduced to 200, and the authorised cubic space for these is only obtained by using some of the dining halls as dormitories; to remedy these defects it has been recommended that a soldiers' institute and 5 more single mens' barracks be constructed. Quarters for a second assistant surgeon and a drill shed for the school of musketry are considered necessary. During the year the ventilation of 3 family barracks was improved, and a hospital with four beds for native troops and followers was completed. The questions of the removal of the civil dispensary to a more convenient site and the increase of the conservancy establishments for the bazar are being dealt with. The proposal to erect a cinerator for the destruction of the whole of the filth of the station is in abeyance, pending the decision of the Military Department as to the type best suited for cantonment purposes.

Saugor.—The water supply is from wells and is good and abundant. It is treated with potassium permanganate. Enteric fever and dysentery furnished but 3 admissions respectively. There were no cases of cholera among the British troops, though an outbreak, limited to the week ending 4th June, occurred among the natives employed in the Royal Artillery lines. The disease was believed to have been due to some infected food. Cholera was prevalent in the district during the rains. Malarial fevers were prevalent from August to December, and together with enteric fever caused the majority of deaths, and it was noted that older soldiers suffered more than new arrivals from the former disease. The number of nights in bed fell for a short time to 4, and sometimes to 3, in August and September, in consequence of the limited garrison, most of the troops having been withdrawn for the Tirah Expeditionary Force. After

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representation the defect was corrected. The medical officer in charge is of opinion that it undoubtedly aggravated, if it did not actually cause, an undue amount of sickness, such as fevers, &c. An epidemic of conjunctivitis among the children lasted for 2 months. The cause was not traced. The construction of dhobies' washing troughs, the supply of movable latrines to groups of bungalows, and sundry repairs to roads and drains in cantonments, were effected during the year. The following defects were brought to notice and are being dealt with: (1) insufficiency of the water supply and defective drainage of the Sadr bazar, and (2) the insanitary condition of a village near cantonments.

BUNDELKHAND DISTRICT.—*Agra.* The drinking and cooking water for the troops was taken during the greater part of the year from the municipal supply, but owing to the prevalence of enteric fever in the garrison and the frequent discovery of the enteric microbe in the municipal water, this supply has been cut off, and well water was taken into use from the 1st December for drinking and cooking purposes, on the recommendation of a special committee which assembled on the 12th November to enquire into the unsatisfactory state of the water supply in connection with recent outbreaks of enteric fever. The wells used are Nos. 4 and 5 British Infantry lines. They are covered in, and provided with pumps. The quantity of water is ample, and the quality excellent. Its distribution is by metal water carts. Throughout the year all water for consumption has been boiled, and treated with potassium permanganate and hydrochloric acid. As regards enteric fever, these methods of purification had no effect in the reduction of the incidence of the disease. The proposed installation of the Pasteur Chamberland filters, for which estimates have been prepared, is in abeyance until it is seen how the system works at Dinapore. There was no crowding in barracks during the year, but the hospital accommodation had to be amplified by using a barrack block and by tents. The clothing was good of its kind, but the medical officer in charge suggests flannellette in place of the "grey back" shirts, which are "much too hard and irritating for any but the coarsest skin." He also recommends khaki serge instead of "khaki drill," which is "not nearly as cool as serge, and when saturated with perspiration becomes a disgusting and unwholesome garment." The canteen has been well managed, and its supplies are good. It is described as a "well enough ventilated, but cheerless place of resort." The conservancy arrangements were satisfactory. Latrines of the Allahabad pattern are in use, and the sewage is buried outside cantonments. The excreta of enteric patients in hospital were burnt. The drainage system of Agra itself is deficient. Some improvements have been carried out, and the question of testing the different levels is under consideration. There are 19 bazars and villages within cantonment limits. They are kept as clean as possible. No new buildings are allowed, and a reduction of the existing buildings is aimed at. The health of the troops was bad. There was a great increase in sickness as compared with 1896. The increase occurred in ague, simple continued fever, enteric fever, and dysentery. There was a high death rate, due chiefly to enteric fever, 49 deaths out of a total of 63 being due to this cause. The increase in ague and dysentery is attributed in part to the fact that the York and Lancaster Regiment arrived in February from Mauritius, where malarial disease was contracted, and in part to the prolonged rains. Enteric fever assumed epidemic proportions in spring (March and April), and in autumn (August and September). Though the York and Lancaster Regiment suffered most, all corps and almost every barrack furnished cases. No less than 4 officers, 187 men and 5 children suffered, and 1 officer and 49 men died. The main conclusions arrived at by the Special committee, above referred to, may be briefly stated as follows: 1. That the outbreaks of enteric were most probably due to the defilement of the Agra municipal water supply; 2. That this defilement took place in the river Jumna above the intake, by the cultivation of melons on sandbanks manured with human ordure, and by the use of the banks as a regular latrine and as a general washing place for dhobies; 3. That with proper precautions to ensure the conservancy of the Jumna for a considerable distance above the intake, and an improved method of obtaining the water from the river, thus avoiding the employment of gangs of coolies (native labourers) working therein, the

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river Jumna is the best available source of supply; 4. That the filter beds at the municipal works were insufficiently protected, and 5. That an additional filter bed is "absolutely necessary to enable the water to be filtered at the proper rate." On a pure supply being provided, the Committee recommended that it should be laid on to barracks, so that the soldier may obtain it direct from the tap, as from their observations the Committee record that it seems hopeless to expect any system of boiling or filtering after it leaves the tap to prove efficient in barracks. Pipes are being laid on to the barracks, and the civil authorities have taken or are taking steps to prevent or minimise the pollution of the river. This Committee made further suggestions in regard to (1) the period of arrival of drafts from England; (2) the period at which musketry and parades should be carried out; (3) the protection of the men from the sun; (4) the time and character of meals, especially the provision of a good early breakfast before the men go out, a lighter mid-day meal, and a supper at the Government expense; (5) the supply of all food and drinks to the soldier from regimental institutes, to the exclusion of native sources; (6) the employment of a better and cleanlier class of native as cooks, in place of the present low class "chamars," and sweepers; (7) the establishment of a central dairy, a central piggery with slaughter house, a central meat market, and regimental bakeries; and (8) the provision of movable latrine seats. These several points are at present receiving attention, and every endeavour is being made to improve the sanitation of Agra generally.

Jhansi.—This station has the reputation of being one of the hottest stations in India, and is said to have surpassed itself in this respect in May and June. There were 9 cases of heat and sun stroke during the year with 3 deaths. The barracks, which are well situated, are built of masonry. Several in the Infantry lines are thatched, and, although cool, are badly lighted, and have a close disagreeable smell emanating from the thatch in the rains. In some of the Royal Artillery barracks the roofs are of corrugated iron, with an underlying protection of felt and a layer of charcoal. This method of roofing is said to be much cooler. Some of the British Infantry barracks are being reconstructed, and are to have only two rows of beds; some of the old pattern barracks are fine airy buildings, but have four rows of beds in each, which is objectionable. A latrine, approached by a covered way, has been added to No. 9 British Infantry married block. In some instances in the British Infantry lines, latrines and lavatories have been under the same roof. In the reconstructed lines this defect will be remedied. Steps are also being taken to increase the accommodation of the hospital kitchen, which is small and in need of a scullery, and to have the ventilation of the new station hospital latrines improved. New sites, further removed from barracks and dwellings, have been selected for depositing the dry rubbish of cantonments, and old and new deposits are to be burnt and the ground cultivated. The former sites, which were too near barracks, and which are believed to have engendered the swarms of flies which pervade the station, are being cleaned. Some minor defects in cleanliness and in the conservancy arrangements were brought to notice. An improved system of conservancy has been sanctioned, and the work of improving the drainage of the Sadr bazar is contemplated. The rations have been good, the kitchens well looked after, and the canteens well managed. The British Infantry have a dairy under European supervision. All water in cantonments is derived from wells, and has been found pure though very hard. All water for drinking purposes has been boiled and treated with potassium permanganate. Cholera furnished 4 cases (all fatal) among the troops between the 18th August and 4th September. The disease is believed to have been imported and did not spread. The Sadr bazar was placed out of bounds. The troops were fairly free from enteric fever until September, when it appeared in epidemic form and continued so to the end of the year, December with 34 cases being the worst month. The disease seemed equally distributed throughout the station. Men of all corps and also the women and children suffered. The medical officer is inclined to ascribe the prevalence to milk or butter or bazar supplies. Some patients and orderlies in hospital developed the disease, and the latter are supposed to have contracted it in the performance of their duties. There were 18 deaths (1 officer and 17 men) from the disease. The native population suffered from famine in the

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surrounding districts more than in almost any other part of India. Arrangements were made for a plague segregation camp for the troops.

At *Nowgong*, a ward in the hospital, which was up till recently used as a church, was taken over during the year, and, in the autumn, for a short period the hospital accommodation had to be further amplified by tents. There was no crowding in barracks. The supplies and rations were good, but vegetables are scarce and scurvy (frequently associated with ague) is not uncommon among the men. An ounce of lime juice was issued day to each man. The milk is supplied from a very good dairy farm managed by the cantonment magistrate. The water is derived from protected wells, and the supply is ample and of good quality. Potassium permanganate is put into the drinking water for 24 hours before use. The latrines and urinals are on the whole satisfactory. The night soil and rubbish are disposed of in limited ground in cantonments too near to the bazars, and flies are numerous in consequence. It is recommended that all dry refuse and stable litter should be burnt daily, especially in the rains, when their removal to a greater distance is expensive and not always practicable. The rainfall was heavy and the prevalence of ague greater than in former years. The disease was attended by marked debility and a scorbutic condition of the gums. "Quinine was used as a prophylactic but with no good result." Enteric fever furnished only one case. The disease was contracted while the patient was on dairy farm duty, and "probably was due to drinking village water, when outside the cantonment." Dysentery caused 5 admissions, cholera and small-pox none, although the last two diseases were very prevalent in the surrounding civil population. Of the 7 deaths, 2 were due to heat apoplexy, 2 to ague, 1 to dysentery, and 1 to enteric fever.

MEERUT DISTRICT.—*Meerut.* The water supply is from deep wells and is good and abundant. Potassium permanganate has been freely employed in cleansing the wells, and the drinking water for the troops has in addition been carefully boiled. Despite these precautions there was no diminution in the incidence of enteric fever, (97 cases, 38 deaths), which seems to be endemic at the station. The disease assumed an epidemic form in spring (March to May), and in autumn (August and September). The Senior Medical Officer is of opinion that the source of the disease is in the Sadr and regimental bazars, and supports his statement by the fact that placing the bazars out of bounds, as an experimental measure, from May 3rd to June 8th, was followed by a marked reduction in the number of admissions for enteric fever. Samples of the drinking water were examined on three separate occasions, and only in one instance was the enteric microbe detected. Two Larymore boilers, for the purpose of boiling the drinking water, have been erected in the British Infantry lines, and several others are in course of erection in the lines of other corps and at the station hospital. The work of extension to the cantonment of the filtered municipal water supply, which is now laid on to Meerut city, is in progress. The rations were of fair quality. Some defects in cleanliness and in the sanitary arrangements of kitchens were represented. There was one case of poisoning from bad cheese, and in May, 31 men of "N" Battery, Royal Horse Artillery, were attacked with symptoms of irritant poisoning three hours after breakfast. The tea was suspected but in neither the washing from the kettles in which the tea was made, nor in the ejecta was any poison detected. The British Infantry regiment has an excellent dairy, which supplies good milk and butter at a fair price. Regimental aerated-water factories, provided with Pasteur Chamberland filters, also exist. The conservancy arrangements were satisfactory, but most latrines have earth floors, in lieu of which flagged floors are recommended. New latrines are being constructed in the British Infantry lines. The night soil is trenched in a grass farm of 56 acres. The main defects at the station are the inefficient surface drainage and the insanitary state of the bazars, especially of the Sadr bazar, in consequence of over population and bad conservancy arrangements. Every endeavour is being made to remedy these defects. The rainfall during the year was heavy and is held accountable for the large number of admissions for ague, which was prevalent from August to November. Venereal disease was very prevalent; the new cantonment rules came into force during the year,

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but they have not been in operation sufficiently long to give any positive results.

Delhi.- Owing to the heavy rainfall the garrison suffered more from malarial fevers than in 1896, the admission ratio being, for malarial fevers alone, 1237 per 1,000. The incidence of these fevers was more marked in the Royal Artillery than in the British Infantry. The men of the Royal Artillery remain in the station for two years before being relieved, while the infantry are relieved thrice in each year, and the medical officer in charge suggests that troops should not be kept at Delhi longer than one year without relief. A house on the "Ridge" was used as a section hospital from 1st August to 31st October, and in consequence of the improvement there in the health of men suffering from ague, the medical officer in charge recommends the removal of the troops to the old cantonment on the Ridge. Being further removed from the river than the Fort the site is likely to be healthier. Means of warming the barracks in December and January are considered necessary, and it is noted that the Kohat stove, used in the hospital for heating, is ineffective. The barrack latrines are close and ill ventilated. The lighting and ventilation of the hospital latrines were improved, and a boiler for disinfection erected. The supplies were generally satisfactory. The meat ration, however, was of poor quality. The water supply is from the municipal works, the intake being from the Jumna and the filter beds about a mile above the city. It is distributed by pipes which are laid on to barracks, kitchens, &c. The supply is ample and the quality good, and no disease has been traceable to its use. There were no cases of cholera, and enteric fever caused only three admissions, only one of which could have been contracted in the station. The cases of dysentery and diarrhœa were also few. In the fort a large tank to hold 97,500 gallons of water has been erected. The water is changed quarterly, and is issued to the troops, but as it is discoloured, and as bowel complaints have been ascribed to its use, it is now allowed to flow to waste, when the water is changed. The water for flushing is derived from wells in the fort. The conservancy arrangements were satisfactory. The night soil is buried in the municipal trenches about a mile from the city wall. There was a considerable amount of intemperance in the garrison with resulting crime, accident and disease.

Muttra.—The barracks are gradually undergoing reconstruction. Two new barracks have been completed. They are well raised, double-tiled buildings with one closed and one open verandah. The ventilation and lighting are good, but the barracks are said to be hotter than the old thatched buildings. The kitchens are, for the most part, very inferior and difficult to keep in order. The new kitchens, however, are satisfactory. The guard room is small and unsuitable, and the cells ill-ventilated and very hot. A site has been selected for a new guard-room with cells attached. In the hospital a pine wood ceiling has been put up below the tiled roofing with a view to rendering the wards cooler. The lavatories are to be entirely remodelled, and two huts for infectious cases have been erected. A new family hospital, proper quarters for the assistant surgeon, a recreation room, and a ward for special cases, such as enteric fever, are required. There was no crowding in barracks. In the hospital, however, the verandahs and the tents had to be used for a short time. The rations were good. The regimental dairy provided excellent butter and milk. The cows are well kept and milked under European supervision. The water supply is abundant and of good quality, but contains a large amount of chlorides. It is drawn from filter tanks attached to covered wells, and is distributed in galvanized iron buckets. The water used for drinking and cooking purposes is boiled before use, and the wells are daily treated with potassium permanganate. Three Larymore boilers have been sanctioned for the station. The conservancy arrangements were satisfactory. The night soil is trenched in a grass farm of about 3 acres. The health of the garrison was not good. There was less venereal disease, but ague was very prevalent, especially in August and September. There were also outbreaks of enteric fever (16 cases, 5 deaths), cholera (9 cases, 8 deaths), and scarlet fever (11 cases, no deaths). The enteric fever cases occurred in April (5 cases), May (2), August (3), September (3), and

India. October (3). The water in some of the wells was found to be contaminated with the enteric microbe, but how the contamination took place could not be traced. The wells were cleaned out thoroughly and disinfected with lime. The first outbreak of cholera was in June (7 cases), when the disease was limited to one squadron and was attributed to the pollution of the water supply. A native who was employed in barrack construction was attacked with cholera two days before the outbreak, near the well from which the drinking water of the squadron was taken. The disease was prevalent in the city and district at the time. The second outbreak (2 cases) occurred in November and is believed to have been due to country bacon, which had been eaten by both the victims, and in a sample of which the cholera microbe was detected by the Government Bacteriologist. The cases of scarlet fever all occurred in November. The prevalence of ague is ascribed to the unusually heavy rains after a year of drought. There were but 2 mild cases of dysentery. Diarrhœa caused 41 admissions, said to have been due to chills principally in the autumn months.

Roorkee.—The lavatories are well appointed but the bathing compartments off them are dark and gloomy, and the disposal of the waste water in absorption pits is objectionable. A ceiling of Swiss pine was added to the hospital during the year, and is a great improvement. The lighting of the hospital is defective. A parturition ward is much needed in the family hospital. The latrines are too near the cook houses and to the married quarters, but no other defect in conservancy is noted. The water supply is from a covered well, and is good and abundant. The water is boiled and distributed in locked vessels. The medical officer in charge advocates pipes being laid on to the barracks. Potassium permanganate is used. The beef is at times of poor quality, and the bread supplied to the coffee shop from the Royal Artillery Bazar is open to suspicion. A dairy in cantonments supplies good milk and butter. The milk is boiled and distributed in locked cans. The sanitary conditions are generally very satisfactory, and the health of the troops has been very good in comparison with other stations. There was the usual prevalence of ague, of a mild type, after the rains; bowel complaints were practically absent, and the station maintained its immunity from enteric fever, for which disease there was but one admission.

Landour.—The water supply is from a spring and is distributed in pakhals. It is excellent and sufficient, but potassium permanganate was used for purifying it. The latrines and conservancy arrangements generally were satisfactory. The night soil is mixed with lime and buried in pits outside cantonments. The only defect brought to notice is the insanitary condition of the native huts in the vicinity of the Government bakery and the slaughter house, and steps are being taken to have them removed. With the exception of ague and venereal disease there was no special prevalence of disease in the garrison. The four cases of enteric fever admitted during the year were imported, as all developed the disease within five days of arrival at the station.

Chakrata and *Kailana.*—The water supply is from fenced-in springs, out of Deoban limestone, situated three miles from cantonments. It is conducted in iron pipes to distribution tanks and is thence conveyed by pakhals. This supply is now being supplemented by collecting the water from springs three miles beyond the present source. The water is of good quality, and though bacteriologically pure, has been boiled throughout the year. In the Kailana huts the ventilation was deficient, and there was some overcrowding during the season as the closed verandahs had been taken into account in calculating the cubic space. The ventilation has since been improved by removing a pane of glass from each window, and is to be still further improved by the insertion of perforated zinc shutters below the eaves. There was a great want of hospital accommodation at both Kailana and Chakrata. The present buildings can only accommodate 150, whereas at times the number of sick amounted to 270. To obviate crowding, cases had to be treated in verandahs and tents. This defect will be partially if not wholly removed when the new hospital at Kailana, the building of which has recently been commenced, is completed. The general sanitary condition of the barracks, latrines, &c., was carefully supervised, the dairies and mineral water factories were also under European supervision, and all milk was boiled. Notwithstanding the minute care in connection with sanitation, not only in the station and its surroundings, but also at the several camps on the road to it from the plains, the sick rate was higher than it has been during the past eight years, the admission ratio being 1,729 per 1,000. For this excessive sick rate venereal diseases were chiefly accountable, though enteric, rheumatic, and scarlet fevers and sore throats also contributed largely. Scarlet fever is said to have been imported from Meerut, and rheumatic fever cases are attributed to the men having to be placed under canvas during the rains, when scarlet fever broke out. Sore throats are said to have been due to defective ventilation in the Kailana huts, and the number of cases fell when the ventilation was improved. Enteric fever accounted for 50 cases, including 1 officer and 1 child. All but thirteen of these cases developed the disease within a month of arrival at the station, and the origin of none of these thirteen cases could be definitely traced. The medical officer in charge remarks in this connection that "the true cause of enteric fever in the "majority of cases which have come under treatment this year, appears to "be infection derived from the soil of rest camps or from the floors of cook-"houses." Three of the cases occurred in a ward of the hospital far removed from the enteric wards and used for venereal cases. The boards were taken up, the soil rubbish underneath removed, and new boarding laid down, and no cases of fever subsequently occurred in it. Excluding venereal diseases the period of prevalence of the chief diseases was: scarlet fever in May and June; rheumatic fever in June, July, and August; sore throats from April to July; enteric fever, April and May; malarial fevers, March April and May. There were comparatively few cases of dysentery and diarrhœa. The Principal Medical Officer states that the decrease in the latter contrasts markedly with the prevalence of hill diarrhœa at Chakrata in 1886, when the water was conveyed to the station in an open channel. There were 9 cases of scurvy due to insufficiency of vegetables. No cases of cholera occurred, but 2 cases of small-pox and 1 of diphtheria (when sore throats were prevalent) were admitted. All the deaths except one were due to enteric fever.

PUNJAUB COMMAND.

The officiating Principal Medical Officer, Surgeon-Colonel L. D. Spencer, M.D., C.B., reports as follows:—

SIRHIND DISTRICT.—*Umballa.* The general sanitary conidtion of the cantonment was satisfactory. Enteric fever prevailed in an epidemic form twice during the year, namely, in April and May, when 27 cases were admitted to hospital, and again in November and December, when there were 69 admissions. The first outbreak chiefly affected the men of the 16th Lancers; its precise causation was never determined, but suspicion attached to the water supply. The second epidemic outbreak of enteric fever was practically confined to the 1st Battalion North Staffordshire Regiment. This battalion arrived from Egypt on November 1st, and was in camp within cantonment limits. The outbreak was clearly traced to the unauthorised drawing of water by bhistis from a condemned well in the adjacent grass farm. The regiment was immediately removed to another camping ground, and all mussacks withdrawn from use; this action was quickly followed by the cessation of the disease. The cantonment water supply is reported as being deficient in quantity, and not above suspicion in quality. The water is derived primarily from wells sunk in the bed of the Tangri River, whence it is conveyed by brick aqueducts to cantonments. These aqueducts are old and were originally constructed for a much larger supply of water than is now obtained. They moreover leak in various places and the water is consequently liable to contamination. Steps are being taken to provide an improved and increased water supply, also to guard against existing chances of pollution in the course of conveyance to cantonments. The usual precautions of boiling and pinking the water with permanganate of potash were adopted. Two cases of cholera occurred; both were men of the Dorset Regiment passing through by rail to Rawal Pindi. Each case was contracted

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outside the cantonment, and was in no way attributable to local sanitary defects. Efforts are being made to improve the supply of milk and butter to the troops in this station, and to place this important matter upon a sound permanent footing. A Government dairy is being established, to be worked under European supervision and on scientific principles. Conservancy arrangements are reported to be working well.

Kasauli.—The general sanitary condition of this station is considered to be satisfactory. The water supply is sufficient in quantity and reported to be above suspicion at its source; it has however to be carried some two miles in pakhals, which is not a satisfactory arrangement. The question of abolishing the use of pakhals, and substituting metal vessels suitable for carrying on pack animals, is under consideration. There were 10 admissions for enteric fever at this station, but half of these undoubtedly brought the infection with them from the plains; the causation of the other five cases was undetermined. Two incinerators for the destruction of fæcal matter are reported to be working satisfactorily. Urine is allowed to run down a shoot to a deep ravine; no smell or unpleasantness is complained of from this arrangement.

Dagshai.—The general health of troops at this station is reported to have been indifferent. There were 80 cases of enteric fever; of these some appear to have contracted the disease while marching up from the plains, while the greater number seem to have become infected at Dagshai itself. The water supply of this station is unsatisfactory, as the surface drainage of part of the cantonment can percolate into it. In one of the two springs which constitute the water supply the enteric microbe was found. Every precaution was taken to secure adequate boiling and pinking of the water with permanganate of potash, and also to boil milk used in barracks, but with unequal results. It is possible that here, as elsewhere, the disease has a multiple origin. Bazar refreshments, watercress grown in suspicious water, and visiting bazars and villages outside cantonments, are considered as possible sources of infection. Three incinerators were in use for destroying excreta, and the urine was disposed of by means of two shoots. No complaints were made in connection with these arrangements. All enteric excreta were cremated in the Station Hospital grounds. Steps were taken to improve the existing water supply by making surface drains above the springs to prevent surface drainage from percolating into them. Further, both springs were walled in with masonry. Three Larymore boilers were in use. It is hoped that the necessity for these apparatus will be removed, as Government has sanctioned a scheme for a new piped supply from an approved source, not liable to contamination. Work has been commenced, and, pending its completion, steps are being taken to vacate the station and to leave it unoccupied during 1898.

Subathu.—The general health of this station is reported satisfactory. There were 33 cases of enteric fever, and of them 16 were undoubtedly brought into the cantonment when the troops came up from the plains in March. The remaining cases were probably indigenous and are attributed to contamination of the water supply by surface drainage. The water supply of this station has been under suspicion for some time, being not only scanty during the dry season, but liable to local pollution. A scheme for a new water supply is now under execution, which will bring in an ample supply from some springs five miles distant in the Solon direction. The conservancy arrangements are reported to be somewhat indifferent. As the one incinerator in use proved inadequate for the requirements of the station, another has been sanctioned.

Solon.—General sanitary condition satisfactory. There were 10 cases of enteric fever reported, and of these probably 4 contracted the disease before leaving Umballa for this station, or on the march. The source of infection in the other cases could not be traced. The water supply appears to be satisfactory, while the conservancy arrangements are also reported as working well. The dry earth system is in use, but some difficulty is experienced in finding suitable trenching grounds for the disposal of the night soil. The hospital accommodation is insufficient, but a new hospital is about to be built.

Jutogh.—The general health of this station is reported to be satisfactory. There were 14 cases of enteric fever during the year, of which 10 appear to have had a local origin; but no definite source of infection was traced. The water supply is considered to be good, but the water has to be carried about two miles in pakhals. The general conservancy is reported to be satisfactory and is carefully attended to. A "Henry" incinerator is in use. *India.*

LAHORE DISTRICT.—*Mian Mir.* The reports for the year from this station are favourable, but the water supply still affords some anxiety, as it is derived from the Bari-Doab irrigation canal and is liable to contamination before it enters the waterworks. Though steps were taken to diminish the risk of pollution as far as possible, samples examined in the early part of the year were found to contain the Eberth Gaffky bacillus of enteric fever. Subsequent to this discovery all water supplied to barracks was boiled and "pinked" with permanganate of potash. Only 14 cases of enteric fever occurred in this garrison during the year, and of these 12 occurred in the early months. The comparative immunity from this disease which prevailed during the latter half of the year is to be attributed to the active steps taken to have the boiling of drinking water in barracks properly supervised. A notable improvement has been brought about during the year under notice, by the provision of special dhobies' ghats, the washing of clothing in tanks and other undesirable places being thus avoided. The new system is working well. The conservancy arrangements are reported to be satisfactory.

Fort Lahore.—The defects mentioned in last year's report concerning the main guard room have been partially removed by an alteration in the east verandah which has greatly improved the conditions under which guard duty is performed. Another improvement has been the introduction of the municipal water supply by means of pipes, in place of the well water of the fort, for drinking purposes. The conservancy arrangements are working satisfactorily. There was one case of mild small-pox and six of enteric fever. The causes in all cases may be legitimately attributed to conditions outside the fort and beyond control, as the station is close to the city, with which there is free intercourse.

Ferozepore.—The general condition of this station is reported to be satisfactory. Tiled roofs are in course of being substituted for the thatched ones in the British infantry lines. The water supply is derived from wells, is good in quality and sufficient. The wells are uncovered, but steps are being taken to have this defect remedied. The provision of a pipe water supply is under consideration. All water used for drinking purposes is boiled and pinked with permanganate of potash. Leather vessels have been in use for drawing water from the wells hitherto, but steps have been taken to substitute metal buckets. There were only 12 cases of enteric fever during the year. The arrangements for washing clothing, &c., have been much improved by the provision of proper dhobies' ghats. The system of conservancy is satisfactory.

Multan.—The general health of this station is reported to be very good. Only two cases of enteric fever occurred during the year. The water supply is reported to be good and sufficient, and that used for drinking purposes is boiled and pinked with permanganate of potash. The arrangements for washing clothing, &c., are unsatisfactory, but funds have now been allotted for the erection of fourteen dhobies' ghats on the separate tank system. The conservancy is conducted on the Allahabad system and is reported to be working well. Increased hospital accommodation will be provided as soon as funds are available.

Jullundur.—General sanitary condition satisfactory. The water supply is good and protected from pollution; all water, however, used in barracks is boiled and pinked with permanganate of potash. There were 14 cases of enteric fever, but several of these were imported by troops returning from field service at the end of the year. The arrangements for washing clothes are still unsatisfactory, but steps are being taken to remedy this by building dhobies' ghats. The conservancy arrangements are reported to be working well. The extensive prevalence of plague in the neighbouring villages during the year has been a constant and grave source of anxiety to the civil and military officials, but the precautions taken have been sufficient to prevent its importation into cantonments.

Amritsar.—There were 14 cases of enteric fever admitted to hospital at

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this station during the year. The water supply is reported to be ample, good, and protected from pollution, but the specific bacillus of enteric fever was found by Mr. Hankin in the supplying well. Steps were at once taken to clean out the well and treat it with permanganate of potash, with the result that the subsequent samples were found to be free from the micro-organism. All water used in barracks is boiled and pinked with permanganate of potash. The arrangements for washing clothes, &c., are considered to be unsatisfactory, but steps have been taken to construct suitable dhobies' ghats. The conservancy arrangements are working well.

Dalhousie.—General sanitary condition is reported to be very good. There were 10 admissions for enteric fever, all of which were probably contracted either in the plains or on the march up. The supply of drinking water is both good and abundant, and is distributed by pipes except to the standing camp at Bani-khet, which has still to be supplied by means of pakhals, as pipes have not yet been laid on. It is hoped, however, that this will soon be done. All water used for drinking purposes at that camp is boiled before use, and no case of enteric fever occurred there. Conservancy is conducted on the trench system, as no ground is available for the working of the Allahabad method. The introduction of an incinerator or of a wire tramway for the disposal of excreta is under consideration. The washing of clothes is under European supervision, but there are no properly constructed dhobies' ghats, and it is stated that no satisfactory site can be found for such.

RAWAL PINDI DISTRICT.—*Rawal Pindi.* The overcrowded condition of both the Sadr and Lal Kurti bazars in this cantonment received much consideration during the year. A proposal to cut new roads through the more overcrowded portions of both bazars is under consideration. More public latrines have been provided, and the question of improving the surface drains is under consideration. The water supply is excellent and most satisfactory it is distributed in barracks by means of galvanised iron buckets. Enteric fever caused 95 admissions to hospital during the year. There was, however, no real epidemic of the disease, as the cases were fairly evenly distributed over the whole period. As regards the etiology of the disease in this cantonment, the medical officer in charge reports that the troops can hardly contract enteric fever in barracks, as they live under the most careful sanitary supervision and surroundings: the water supply is pure and abundant; little milk is used, and what is consumed is boiled, and other food supplies are of good quality. A very possible source of infection is the kitchen, but commanding officers appear to be doing their utmost to improve the cooking arrangements. If the food could be cooked by the British soldier, thus enabling native cooks to be abolished, considerable improvement might be looked for. There is little doubt, however, that the majority of cases of enteric fever are contracted in the drink-shops and brothels of the bazar. It is a noteworthy fact that only two cases of enteric fever occurred among the officers, and none among the women. The conservancy arrangements are good and working satisfactorily.

Sialkot.—The general health of troops and sanitation are reported as being satisfactory. The water supply is good and abundant. A new scheme for a pipe supply is, however, under consideration. Enteric fever caused 15 admissions to hospital. A few of these were undoubtedly introduced from elsewhere, but no satisfactory explanation of the origin of the other cases was apparent. Proposals for building suitable dhobis' ghats are under consideration. Conservancy is well conducted on the Allahabad system.

Campbellpore.—There were only 5 deaths among the troops during the year, all being due to enteric fever. The disease appeared in the 57th Field Battery, R.A., early in the year, the battery having only arrived in the country in the previous November. The medical officer attributed the disease to recent arrival in the country, and to insanitary conditions in the vicinity of cantonments. These latter consist of a village within 100 yards of cantonment limits, and a group of houses some 20 yards from the lower end of the bazar, neither of which is subject to cantonment rules. The attention of the civil authorities has been called to the necessity for increased sanitary supervision being exercised over these places. The water supply is reported as being good and abundant, and permanganate of potash is added to that supplied to barracks. Conservancy on the Allahabad system is working well.

Attock.—The general sanitary condition of this fort is reported as being satisfactory. The water supply is variable in quantity but reported as good. That used for drinking purposes is boiled and pinked with permanganate of potash; a scheme for pumping water from the Indus into the fort is under consideration. Malaria is very prevalent in the autumn, when the flood water of the Indus has run down, leaving large tracts of drying mud exposed. The conservancy arrangements are satisfactory.

Murree Hills.—The general sanitary condition of all these hill stations has been very satisfactory. Only 14 cases of enteric fever occurred during the year, in the greater number of which there was considerable evidence that they had been contracted elsewhere. The trench system of conservancy is in use everywhere and works satisfactorily.

Murree.—The sanitary condition is satisfactory. The water supply from Dunga Gali is excellent, but apt to run short in dry seasons. With a view to obviating this, some additional springs are about to be included in the catchment area at Dunga Gali. Two cases of enteric fever occurred, one being that of a man who undoubtedly contracted it on the march up while the other case was apparently contracted by direct contagion from the previou one. Excreta are carried down the hill side to the trenches by means of a wire tramway.

Gharial.—This cantonment is furnished with water from the Murree system, and a new reservoir has been constructed on the Upper Topa Hill for the supply of Gharial and Lower Topa. The general sanitation is good. A new hospital is in course of construction. Excreta are removed by means of a wire tramway. Eight cases of enteric fever occurred, and as all of these were admitted shortly after the arrival of the troops from the plains, their causation may be attributed to infection contracted en route.

Kuldana.—No enteric fever occurred during the year. The water supply is derived from the Murree system. Conservancy was well carried out, all excreta being conveyed down the hill side to the trenching ground by means of a wire tramway.

Lower Topa.—One case of enteric fever occurred in a man just arrived on furlough from Sialkot. All the troops were under canvas. The general sanitary arrangements are reported to be very good and the wire tramway system is working satisfactorily. Water is derived from the Murree supply.

Thobba.—The sanitation of this station was good. The water supply is the same as that for Murree. There was one case of enteric fever, and this occurred in a man who had recently arrived from the plains. The majority of the troops were accommodated in tents, one company of Garrison Artillery being housed in stone barracks. During the rains, when much discomfort was experienced by those in tents and more especially by the women and children, warming and drying were partially secured by means of charcoal stoves. Conservancy was efficiently carried out. It is hoped that the building of the new hospital will shortly be commenced.

Khyra Gali.—The sanitary condition of this station is good. All the troops are in stone huts. The hospital is somewhat small for the needs of the garrison, but a new stone building is under construction. The water supply is from Dunga Gali and is good. There was one case of enteric fever. Conservancy is well carried out.

Ghora Dhaka.—The general health and sanitation are satisfactory. The water is derived from springs, which are well protected from pollution. It is conveyed by pipes, and is stored in galvanised iron cisterns. For subsequent distribution, pakhals and mussacks have to be used, but these are systematically cleaned out with permanganate of potash. All the troops were under canvas, and during the rains an allowance of wood and charcoal was given for drying and heating purposes. There were no cases of enteric fever. Conservancy was satisfactorily carried out.

Changla Gali.—The sanitary condition of this station is reported as satisfactory. New quarters are being erected, and are gradually replacing the former old and unsuitable wooden huts. The water supply is derived from springs and is satisfactory. Conservancy is well attended to.

Kalabagh.—All the troops and families are housed in huts, for the most

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part built of wood. These are gradually being replaced by stone buildings. There was no overcrowding. The water is collected in a reservoir from springs. It is good in quality and sufficient in quantity. All drinking water was treated with permanganate of potash, and the various pakhals and mussacks were washed out weekly with a strong solution of the same. Conservancy arrangements are satisfactory.

Bara Gali.—The health of the troops in this station has been good. One case of enteric fever occurred, contracted during the march up from Rawal Pindi. The water supply is good. Barrack accommodation is still unsatisfactory, but it is hoped that the present old wooden huts will shortly be replaced by stone buildings. Conservancy arrangements are satisfactory.

PESHAWAR DISTRICT.—*Peshawar.* Owing to the concentration of troops, connected with the frontier field operations, sanitation required very careful attention, but no special increase of sickness has been reported. As in former years, malarial fever was very prevalent during the autumn, but the type of fever does not appear to have been so virulent as in previous years. Eighty-seven cases of enteric fever were admitted to hospital during the year. Of these, 44 cases were admitted during October, November and December, after the concentration of troops in and about Peshawar, and a large number of the cases were contracted at Jamrud and Hari Sing ka Burj. The water supply, derived from the Bara River, passes through settling tanks and filter beds, and is finally distributed by pipes. It is reported to be good, but an installation of Pasteur filters has been sanctioned, and it is hoped will soon be in working order. An apparatus for sterilising the sand employed in filtering the water has been supplied. Conservancy on the Allahabad system has been well carried out. The arrangements for washing clothes, &c., in this cantonment are unsatisfactory, but steps are being taken to provide suitable dhobis' ghats for this purpose. Owing to the large influx of sick—transferred from the troops encamped in the immediate vicinity of cantonments in connection with field operations—the hospital accommodation had to be supplemented by tents during the last quarter of the year.

Nowshera.—The water supply is reported as being good and abundant and is derived from wells properly protected from pollution. The question of a pipe supply is under consideration. All water was boiled and pinked with permanganate of potash. Enteric fever caused 12 admissions to hospital, chiefly in May; and there is reason to think that most of the cases were contracted in the bazars. It is noteworthy, however, that the enteric micro-organism was found in the hospital well in June, and the well was at once closed. The hospital compound is only partly enclosed by a wall, thereby affording unnecessary and objectionable facilities for irregularities to occur. Conservancy is well carried out on the Allahabad system.

Cherat.—The general hygienic conditions of this sanitarium are unsatisfactory. There were no less than 80 admissions for enteric fever during the year, of which 73 were attributable to local insanitary conditions. Though the station is over 4,000 feet above the sea level, the climate is tropical. The water supply is very unsatisfactory, as the source is three miles from the station and 1,500 feet below it, and all the water has to be brought up in pakhals. It is liable to contamination at its source, as well as during conveyance in the pakhals, and, owing to difficulties regarding transport, the supply for ablutionary purposes is deficient. A new scheme for pumping water up from its source and distributing it by pipes is under consideration. The barrack accommodation is insufficient, nearly half the troops being in tents. There is an insufficient supply of urinals to the barracks, with the result that local soil pollution is liable to take place. The conservancy arrangements are unsatisfactory. The one incinerator in use was inadequate for the demands made upon it, and some of the night soil had to be trenched, an unsuitable mode of disposal owing to the nature of the neighbouring soil. A wire tramway for the removal of excreta down the hillside to ground suitable for trenching purposes is much required. The hospital accommodation is inadequate, and had to be supplemented by tents, which are not suited for the sick owing to the heat of the climate. A proper system of surface drainage is required to prevent pollution of the ground adjoining the barrack-rooms. Suitable quarters are necessary for the officers, nursing sisters, and Army Hospital Corps attendants. It is hoped that it may be possible to remedy the more important defects at an early date, but the expenditure of a large sum of money will be necessary to effect the desired improvements at this station.

MADRAS COMMAND.

The Principal Medical Officer, Surgeon-Major-General C. E. McVittie, Q.H.P., Indian Medical Service, reports that the sanitary condition of the various stations in the Command has been satisfactory during the year, and the following notes are added regarding each district and station.

MADRAS DISTRICT.—*Poonamallee.* The sanitary condition is satisfactory, and the accommodation for British troops in barracks is ample and the ventilation good. The water supply is plentiful, of good quality, but hard. It is obtained from wells (uncovered), drawn by hand and boiled before use. Necessary action has been taken with a view to the wells being covered and pumps erected. The health of the troops has been, as usual, particularly good. Enteric fever rarely occurs at this station. The hospital accommodation is also ample and in a good sanitary condition, and many convalescents are sent to Poonamallee with advantage.

Saint Thomas' Mount and Pallaveram.—No insanitary conditions exist, the health of the troops has been good, and there has been no unusual prevalence of any particular disease. No quarters are provided for men of the Army Hospital Corps at St. Thomas' Mount, who accordingly have to live in the bazar.

Madras.—The ventilation of the Wallajah Gate and Fort Saint George guard rooms is insufficient, and on this account the latter has not been used. The ventilation of the large infantry cook house, and of the R.A. wash house and cook house for sergeants and married quarters is also insufficient. There have been 5 cases of enteric fever admitted to the Station Hospital during the year, but no connection could be traced between these and any insanitary condition of the fort. The new detention hospital is expected to be completed in April next (1898). This will be a great improvement as the old Station Hospital is a wing of the General Hospital and situated close to a dusty noisy road.

SOUTHERN DISTRICT.—*Wellington.* Defective surface drainage and want of accommodation, both in barracks and hospital, are the two points which received attention during the year. In barracks, the drains have been lengthened where necessary, and new drains made; in the Station Hospital compound the surface masonry drains are in good order, but outside, they are mere channels. When the buildings, which are in process of construction, have been completed, masonry drains will be made. Great progress has been made in the way of increasing hospital accommodation. A ward for 12 beds has been added to No. 1 block, the old surgery and offices have been converted into a ward for 5 beds. A contagious disease ward, new mortuary, store-room, surgery, assistant surgeon's room, receiving room, and two offices and a block for fourteen patients, consisting of a general ward for 10 beds, and an ophthalmic ward for 4 beds, have been completed. A disinfecting room has also been built, and a ward for 15 beds, a laundry and quarters for the senior assistant surgeon, are in process of construction. In barracks a double company cook house has been built, also wash houses for three barrack rooms. Some married quarters are being converted into single mens' quarters, with a view to increasing accommodation for the latter, but when this has been completed the accommodation in barracks will still be insufficient and tents have to be used during a few months of the year.

Cannanore, Calicut and Malapuram.—The sanitation of these stations has been good, but that of the native surroundings bad. Ventilation and drainage of barracks and hospitals are satisfactory. The row of native huts at

India. Malapuram, mentioned in last year's report, is being demolished. At Calicut, Anderson's flues have been put in the barrack cook house, an incinerator has been built, and new married quarters are in process of construction. The filling in of the foul tank, mentioned in last year's report, as being liable to contaminate a well, which might, in case of emergency, be used for drinking purposes, has been again postponed by the municipality.

BELGAUM DISTRICT.—*Belgaum.* The general sanitary condition has been satisfactory, and the conformation of the ground favours drainage, there being a general slope from north-west to south-east. With the exception of the R.A. barracks, where new cement drains have been put down, no special sanitary changes have been found necessary. Pakhals and mussacks are used for the drawing and carrying of drinking water from the wells, which, though well constructed, and so situated as to be free from contamination by soakage, were not covered. Steps are being taken to improve this system of water distribution, and the municipality are considering a scheme for supplying the cantonment and city with water, while the general question of erecting pumps at stations where it is the practice to draw water by hand has been taken up. The Station Hospital buildings are old and somewhat crowded together. Some improvements have been effected during the year, viz., verandahs, the floors of which were originally made of dried mud, have been paved with stone, and a boiler has been added for disinfection. By re-appropriation there has been an increase of two wards during the year, the quarters occupied by the assistant surgeon in sub-medical charge having been converted into a general ward for women and children and the ward previously used for women and children converted into an officers' ward and a ward for serious cases. This arrangement increases the hospital accommodation by 12 beds. As funds are available new public latrines are being constructed and the general sanitation of the city is being attended to. With the exception of four cases of cholera, there was no unusual sickness amongst the British troops, but the native troops, particularly the 26th M.I., and the civil population, suffered severely from plague imported most probably from Poona and Bombay. Amongst the native troops there were 82 cases of plague with 48 deaths, men, women and children being equally affected, but, thanks to the excellent work done by the Belgaum Plague Committee and to the medical officers generally, the disease has been almost stamped out.

Bellary.—The chief question affecting the health of the troops at Bellary is the water supply. At present the drinking water is drawn by hand in leather buckets from the storage tanks and distributed by pakhals, a system open to grave objections, and to which attention has been frequently drawn. It was originally the intention to introduce a piped water supply for the whole of Bellary, but a project for the provision of a pipe supply for the cantonment alone is now under consideration. The ventilation of the wards in the Station Hospital is unsatisfactory, the large upper wards being draughty and the small lower rooms stuffy. The surface drainage around the Station Hospital consists of shallow gulleys communicating with neighbouring nullahs. It is far from satisfactory. The slop water from bath rooms and lavatories runs into cement catch pits, difficult to clean out. The only diseases which occurred in an epidemic form amongst the European troops and their families were catarrhal conjunctivitis, enteric fever, and influenza. Of the 8 cases of enteric fever, 6 occurred in men of the Royal Artillery; and the probabilities are that the disease was contracted in the bazar, since all the men were known to frequent it.

Ramandroog.—The disposal of filth by burial is, at this station, unsatisfactory, owing to the shallowness of the soil, and it is accordingly burnt in a trench. As the station is only occupied by troops for four months in the year, and by a few men (about 100) it is not considered necessary to erect an incinerator. Sanitation receives every attention, and the Bellary District Board have allotted money for a conservancy staff and for other expenditure connected therewith.

BANGALORE DISTRICT.—*Bangalore.* At this station during the year under report there have been high rates of admission, invaliding and death as

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compared with previous years. The increase in admissions was due to fevers and injuries, and may be put down to the 1st Battalion Dorsetshire Regiment having left its sick and weakly men behind, when proceeding on field service, and to the 4th Q.O. Hussars (which arrived in India, during the year, from England) not being acclimatised, and having a good many young soldiers. The increase in invaliding, (107 men were invalided during the year as compared with 58 the previous year), was due to secondary syphilis, a number of men of the Dorsetshire Regiment having been found unfit for active service on this account. Out of the 25 deaths during the year, 12 were due to enteric fever, which disease was more prevalent than ever, there having been 67 admissions against 47 in 1896, and 18 in 1895. No particular corps was specially affected, and as usual no definite cause could be traced, though it may be observed that the troops were out at a camp of exercise for a fortnight in the latter part of January, returning to Bangalore on the first of February, during which latter month 17 cases were admitted to hospital. It seems certain, therefore, that these cases, occurring as they did in the form of a miniature epidemic, must be attributed to some cause to which the troops were exposed whilst in camp, and that so far as origin is concerned, they had no connection with the station or barracks. Measures have been taken which practically prevent any pollution of the slaughter house well, which is still one of the sources of drinking water for British troops. The new pipe water scheme has reached the British Infantry barracks, but the distribution to the other barracks is not expected to be complete until the middle of 1898. The milk supply for the station and section hospital is from the Commissariat Dairy contractor. Sheds are being built near the dairy, and very shortly all cows will be under supervision. As regards improving the general sanitation of the station itself, much has been done lately. A Public Health Laboratory, Health Department and Committee have been formed, municipal conservancy has received increased attention, monthly disinfection of public wells has been carried out, and rules for the regulation of aerated water factories brought into force.

SECUNDERABAD DISTRICT.—*Secunderabad.* Enteric fever, as usual, prevailed to a large extent in Secunderabad amongst the British troops, causing 95 admissions with 23 deaths as compared with 96 admissions and 18 deaths during 1896, when the majority of the cases occurred during July and August, and affected principally the 1st Battalion Northamptonshire Regiment. In the year under review (with the exception of October, during which there were 23 admissions) the disease was equally distributed throughout the several months and affected no regiment in particular. The records for the past ten years give negative results as regards the association of the disease with insanitary conditions in any particular building, and it is concluded that a great many cases are contracted in the bazars, and in no way connected with the barracks. Every possible precaution is taken as regards the water supply. The water is boiled, permanganate of potash is added, and the water then conveyed in zinc buckets to iron tanks, where it is locked up ready for use. Provision has now been made to supply the troops with a piped water supply from a tank about four miles distant. The general sanitation of Secunderabad itself is receiving careful attention. A new market is desirable, the present market being insanitary and in too crowded a site ; but this question is held in abeyance for the present, all available funds being required for the introduction of an adequate system of drainage. Want of accommodation still exists at the station and section hospitals, but tents were not necessary this year owing to the 1st Battalion Northamptonshire Regiment having been away on field service. Extra accommodation for 100 beds is being built. At the section hospitals, disinfecting sheds and laundries are being built. Lugard's ovens have been supplied to the cook houses, and quarters for 12 single and 18 married men of the Army Hospital Corps have been erected. The lower floors of the double-storied barracks in the Royal Artillery lines, subject to necessary alterations in ventilation and lighting, are to be used as barrack rooms. Cholera prevailed to a great extent amongst the civil population in Secunderabad during June and July, and so many cases occurred in the 3rd M.L.I. that the regiment had to be moved into cholera camp. Fortunately, however, only a few isolated cases

India. occurred amongst the British troops. Altogether there were 8 cases and 4 deaths among British troops, and 31 cases and 17 deaths among native troops.

RANGOON DISTRICT.—*Rangoon.* The sanitation in cantonments has been well looked after; the chief sanitary defect being the drainage of the Sadr bazar, which is situated between the barracks and the city of Rangoon. The matter is under consideration. Venereal diseases are on the increase here, and it has been found impossible to limit their prevalence under the new cantonment regulations, since the women live outside cantonment limits and are thus beyond legislation. Nearly half the admissions to hospital have been for these diseases. Most cases are of a mild type, but many are exceedingly severe. On this point the Principal Medical Officer remarks that "some of the worst cases of secondary syphilis to be seen in the army are, I think, to be found at Rangoon." The hospital accommodation has been again found insufficient. It is equipped for 139 beds, but the number constantly sick exceeded this number very considerably during the greater part of the year. This is due to the fact that Rangoon is the port of embarkation and disembarkation for Burma, and the numbers in hospital are consequently increased by invalids from other parts of Burma awaiting invaliding boards or embarkation, and by the sick left behind by troops arriving from other stations. The Royal Artillery barracks and married quarters, mentioned in last year's report as being old and insufficient, have been condemned and new buildings are proposed for erection. At present overcrowding is avoided by men being sent to the river forts, and by the fact that a large number are in hospital. Enteric fever prevailed to some extent, there having been 24 admissions. They were distributed generally over the 12 months, but there was more prevalence in June and July, the months when the rains are heaviest and when surface pollution would, consequently, be most likely to affect the drinking water. The wells in the British Infantry and Royal Artillery lines have been relined where necessary, in order to prevent this, and the water used for drinking purposes is being specially examined bacteriologically by Surgeon-Major A. M. Davies, Army Medical Staff. A scheme for improving the sanitation of all the bazars in cantonments is being considered.

Meiktila.—The chief defect at this station is the liability to contamination of the drinking water from surface drainage around the lake. The prohibition of cultivation near the edge of the lake and the removal of villages from the collecting area are the only remedies. A scheme for the supply of water through pipes has been sanctioned. In the meantime a pump has been erected, thus preventing pollution by the water carts being driven into the lake, as was the practice formerly.

Thayetmyo and Port Blair.—There is nothing special to note in connection with these stations; the health of the troops has been good, and both stations are in a good sanitary state.

MANDALAY DISTRICT.—*Mandalay.* Malarial fevers have been prevalent during the last four months of the year amongst the British troops, especially among the Royal Scots. The drainage in cantonments is defective and the character of the surrounding country is flat and in many parts below the high water level of the river, the result being, that during the rains, the country around is for miles under water, and there is waterlogging and saturation of the soil, conditions which no doubt give rise to malaria. A sum of R10,000 was allotted for the drainage of Fort Dufferin in the year under review, but, seeing that the work was estimated to cost R50,000 and that it is desirable to complete the work all at once and not by instalments, the estimate was withdrawn by the Local Government and the full amount will be allotted later. The water supply remains in the same condition as noted last year. Every precaution is taken to prevent pollution, but no amount of supervision can do this entirely. The troops, however, remain peculiarly free from water-borne disease. The water is boiled and permanganate of potash added before use. Special vessels are being constructed for boiling the drinking water in the British Infantry cook houses instead of as at present in the open. The mineral water factory of the Royal Scots supplied all the aerated waters for the canteens (British

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Infantry and Royal Artillery). The water used in the factory is obtained from a well at the brewery and is of excellent quality. The question of sinking wells for supplying drinking water has been under consideration during the year. The accommodation in barracks has been ample, but in the Station Hospital insufficient. Owing to the large number of admissions for malarial fevers during the last few months of the year, surplus sick were treated in tents and in the library of No. 2 block, which was converted into a ward. Last year No. 6 Mountain Battery, R.A., suffered much from sickness after returning from the camp of exercise at Maymyo; but this year the men appear to have derived benefit from the change.

Shwebo.—The general sanitary condition of this station and the health of the troops has been good. The cantonment is situated on a plateau, two miles from Shwebo itself, with a gradual slope on all sides, so that the drainage is good The accommodation in barracks, hospital and married quarters has been sufficient.

Bernardmyo.—Sanitation has been well attended to and the station remains fairly healthy, but the question of vacating it is under consideration on account of its only being approachable during certain months of the year and expensive to maintain, and consequently few improvements have been made.

Bhamo.—Money has been allotted to improve the drainage of the fort, and the work is in hand. Battery followers, having no quarters, have been in the habit of sleeping beneath the barrack rooms, and the provision of accommodation for them is under consideration. Malarial fevers prevail during certain seasons. The ground to the south-west of the fort is marshy and is flooded by the Irrawaddy at high water. The health of the troops has, however, greatly improved latterly.

BOMBAY COMMAND.

The Principal Medical Officer, Surgeon-Major-General A. F. Churchill, M.B., has made the following reports on the sanitary condition of the various stations :—

POONA DISTRICT.—*Poona.* The health of the troops has been very good and the sanitary condition of barracks and hospitals satisfactory. The accommodation is ample, the buildings are well ventilated and kept in good order. There was no overcrowding and no representations were made. Although plague has been epidemic both in the city and cantonment almost throughout the year and about 400 soldiers have been employed on plague duty, only one man, a bombardier in the District Staff Office, who lived in the Sadr bazar, was attacked. That was in September. He recovered. There were 2 mild cases of plague among officers, probably contracted through their servants, and 1 among women. All recovered. One case of cholera (which recovered) occurred in a man of the Durham Light Infantry, who lived out of barracks. Enteric fever caused 36 admissions and 5 deaths against 35 admissions and 12 deaths during the preceding year. During the whole year drinking water has been boiled and afterwards treated with permanganate of potash.

Kirkee.—The general health of the troops has been bad owing to the prevalence of malarial fevers. The sanitary condition of the barracks and station has been carefully attended to and has been quite satisfactory. The want of accommodation for the troops still continues. The sunken masonry cisterns, into which the sullage water from the drains of the cook and wash-houses of the married quarters and Infantry detachment sergeants' mess is carried, are altogether unsatisfactory, being too near inhabited buildings. A scheme has been proposed for abolishing these cisterns and substituting surface drainage. It has also been suggested to erect galvanised iron latrines for natives employed about the barracks in order to avoid fouling of the ground in the vicinity. It has also been recommended to erect a laundry in the hospital compound and to remove the kitchen from its present objectionable site between the latrine and mortuary. The work connected with the filtration of water is nearing completion. All drinking water has been boiled and treated in the usual way. One case of cholera occurred among men and 6 among children. Except one fatal case of a child all recovered. Enteric fever caused 15 admissions and 5 deaths. An officer was also attacked but he recovered. Plague prevailed in an epidemic form in the bazar but the troops did not suffer.

Ahmednagar.—The general health of the troops has been indifferent. The accommodation has been ample, and it has been supplemented by apportioning a building in the Ahmednagar Fort for a company of infantry. The sanitary condition of the barracks and hospital has been satisfactory. The nuisance arising from the refuse water drains has been remedied by the planting of trees near the outfall. Since plague has been prevalent in the district the clothes, which were hitherto washed in the Bhingar Nullah, have been washed at a well in cantonments. Drinking water has been boiled. Enteric fever caused 30 admissions during the year and 11 deaths, 2 of the latter being cases admitted in 1896.

Satara.—Owing to the prevalence of ague and venereal disease the health of the troops has been on the whole indifferent. Cholera was prevalent in the city during the hot weather but no case occurred amongst the troops. There was a severe epidemic of plague during the latter half of the year in the district, and cases also occurred in the city but not among troops. The necessary precautions as regards boiling of water were adopted, and the city was placed out of bounds. The accommodation is ample and the water supply abundant. No cases of enteric fever occurred. 50 men are located in Satara Fort, and although this fort is nearly 1,000 feet higher than the barracks, the men there are much more unhealthy than those in the barracks below. The apparent cause is a pond of stagnant water in the Fort which cannot be drained without great expense owing to its being enclosed in rock. It is in contemplation to remove the troops from this fort to the barrack below, where there is sufficient accommodation for all.

Purandhur.—The year has been a healthy one, and only six cases of illness may be said to have originated in this station during the year. The sanitary condition of barracks and hospital has been good and, the accommodation and ventilation ample, as also the water supply. The total number of convalescents sent up has been 190, a decrease of 152 as compared with the preceding year. No deaths occurred. There was one case of plague. The man was a convalescent from Kamptee and probably caught the infection in the train while *en route*. He recovered. The sanitary condition of some of the private bungalows still requires improvement, but there appears to be lack of power to enforce this.

MHOW DISTRICT.—*Mhow.* The general health of the troops has been bad almost throughout the year, owing to the prevalence of venereal disease and malarial and enteric fevers. There have been two distinct epidemics of enteric fever. The first made its appearance in March, and lasted till the end of May, and the second commenced in June and ended in September. A court of enquiry was held to enquire into the cause of the first epidemic, and the outbreak was traced to the milk and butter supply. Altogether there were 81 cases of enteric fever in Mhow during the year, an increase of 11 as compared with the preceding year, and 28 deaths. A sewage farm and boiling and washing places at the dhobis' ghat were provided during the year, and a government dairy and bakery are in course of construction. A separate building for infectious cases at the hospital for soldiers' wives and children is urgently needed.

Nasirabad.—The general health of the troops has been bad owing to enteric fever and venereal disease. Much has been done recently to improve the sanitary condition of this station, but very much yet remains to be done. There were 25 cases of enteric fever and 12 deaths, also 4 cases of cholera, 3 of which proved fatal. According to the report of the Government analyst N.W.P. the Danta water, used for drinking purposes, contains the enteric microbe. A cantonment dairy has been started, and has been carefully supervised. There has been no over-crowding.

Neemuch.—The general health of the troops has been bad owing to the prevalence, as usual, of malarial fevers. The barracks and hospital are well ventilated and there has been no overcrowding. The milk supply is defective, and a small dairy is essential. Enteric fever caused

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7 admissions, 3 of which were imported from Nasirabad, and the rest were probably contracted in the bazar, there being no insanitary condition connected with the barracks. No cases of cholera occurred, in fact there has been no case since the practice of putting permanganate of potash into the wells has been adapted. The drinking water is good, and it is boiled and treated with permanganate of potash, but these measures seem to have no effect on the prevalence of malarial fevers. A permanent hut for infectious diseases is very much needed. The question of whether Neemuch ought to be abandoned on account of its unhealthiness is now seriously engaging attention.

Indore.—The health of the troops during the year has been fair, and the sanitary condition of barracks and hospital satisfactory. No epidemics prevailed. There was one fatal case of enteric fever and one of remittent. Both the milk and water supply are good.

Taragarh.—The health of the troops has been good and also the sanitary condition of barracks and hospital. No cases of enteric fever, cholera or any other epidemic disease occurred. The native village near the sanitarium is, in the opinion of the District Principal Medical Officer, a standing menace to the health of the troops.

BOMBAY DISTRICT.—*Bombay* (*Colaba*). The general health of the troops has been good, but venereal disease and ague have been prevalent. Plague broke out in Bombay City in a severe epidemic form in September, 1896, and, as has been previously reported, the city and town have been kept out of bounds and all precautions taken. There were 3 cases among the troops, but all recovered. The sanitary condition of the barracks has been satisfactory, and well looked after. Enteric fever caused only 4 admissions and 1 death. The new hospital is still under construction and a R.A. Barrack has been taken up temporarily to accommodate the sick.

Deolali.—The health of the troops has been fair, and the sanitary condition of barracks and hospital satisfactory. There has been no overcrowding, as this has always been prevented by increasing tent accommodation. The water is good and abundant. It is boiled and treated with permanganate of potash. There were 4 fatal cases of cholera (3 men and 1 woman), but there has been no epidemic. Plague has never appeared either in Deolali or in its immediate vicinity. Enteric fever caused 15 admissions and two deaths, 5 only being cases contracted in the station.

Khandalla.—The health of the convalescents has been fair, and the sanitary condition of the sanitarium good. A few cases of plague have occurred amongst the native population. The bazar was placed out of bounds. No cases of enteric fever occurred, nor were there any deaths. The want of accommodation for the hospital staff still continues.

DEESA DISTRICT.—*Deesa*. The general health of the troops has been bad. There has been no overcrowding, defective ventilation, or defects in drainage or latrines. To prevent the contamination of water, which is drawn from a well, a pump has been constructed, and prior to distribution it is treated with alum and permanganate of potash. Enteric fever caused 15 admissions and 7 deaths. These were nearly all among young soldiers and recent arrivals in the country. The prevalence of enteric fever during 1897 shows an increase as compared with previous years, and is attributed to the drinking of impure water outside the barracks. There were two cases of small-pox, both of which recovered.

Ahmedabad.—The general health of the troops has been bad owing to malarial fevers and venereal disease. The sanitary condition of the barracks and hospital has been satisfactory. The water supply is good and reported to be singularly free from the germs of water-borne disease. The boiling of water and treating it with permanganate of potash have, however, been carried out. Enteric fever caused 2 admissions and 1 death. The city was placed out of bounds owing to the prevalence of small-pox and plague. One case of the former disease accurred omongst the troops.

Mount Abu.—The general health of the troops and the sanitary condition of barracks and hospital have been very satisfactory. The water supply was good and abundant. There were no epidemics or cases of enteric fever.

India.

The milk and butter supply, though better than formerly, is still not perfect, and a proper dairy is desirable.

ADEN DISTRICT.—*Aden*. The health of the troops has been indifferent. owing to the prevalence of venereal disease and simple continued fever. There has been no overcrowding or defective sanitary conditions, and no recommendations have been considered necessary. The new hospital at Steauer Point was taken into use in November. It is a two-storied building in an excellent position and fulfils a longfelt want. A new hospital at the Crater has also been proposed. There was no enteric fever or any epidemic disease. The condensed water supply has been sufficient and on the whole good.

SIND DISTRICT.—*Karachi*. With the exception of the prevalence of malarial fevers, due largely to the want of efficient subsoil drainage, the general health of the troops has been very good. There has been no overcrowding or defects in ventilation. The water supply is good and plentiful. Till the end of the first half of the year plague continued to rage amongst the civil population but the troops did not suffer. Enteric fever caused 9 admissions and 4 deaths.

Hyderabad.—The general health of the troops has been indifferent owing to venereal disease and malarial fevers. The sanitary condition of the barracks and hospital has been satisfactory. The urinals, however, require improvement. The old disused hospital cook-house has been renovated and taken into use as a hospital store. Plague has been epidemic in Hyderabad City, and a few cases also occurred in the Sadr bazar. Both the city and barar were put out of bounds for nearly seven months. The water supply has been deficient at times owing to want of sufficient pressure at the intake.

NAGPUR DISTRICT.—*Kamptee*. The health of the troops has been fair and the sanitary condition of barracks and hospital satisfactory. There has been no overcrowding, and the ventilation, drainage and latrines are satisfactory. The water supply has been good and sufficient and the usual means of purification have been attended to. A few improvements have been made to the hospital. There have been no epidemics. Enteric fever caused 10 admissions and 4 deaths as compared with 12 admissions and 6 death during the previous year: one fatal case of cholera occurred.

Sitabuldi.—The general health of the garrison has been good. There has been no overcrowding and the ventilation and sanitary condition of the drains, latrines and surroundings have been very satisfactory. No enteric fever nor any epidemics prevailed. The water has been good and sufficient and it was treated with permanganate of potash. The roof of the barrack room has leaked and required constant repair.

QUETTA DISTRICT.—*Quetta*. The health of the troops during the year has been satisfactory owing to the decrease of venereal disease. There was an outbreak of enteric fever, 52 admissions and 11 deaths. The disease was not confined to any particular corps or block of building and the exact cause of the outbreak has not been traced. The necessary precautions were taken, viz., boiling of milk and drinking-water and treating the latter afterwards with permanganate of potash, thorough disinfection and boiling of clothes of affected persons and burning their excreta. The general sanitary condition of barracks and hospital has been satisfactory, there being no overcrowding or defective ventilation nor defects in drainage, latrines and water supply. Quarters with outhouses for five assistant surgeons have been constructed during the year.

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK among the Ratios per 1,000 of the Strength, and the Average Ratios for 10 Years.

Average Number constantly Sick.	Ratio per 1,000.				Average Ratio per 1,000 from 1887 to 1896.			
	Admissions.	Deaths.*	Invalids finally discharged.*	Constantly Sick.	Admissions.	Deaths.*	Invalids finally discharged.*	Constantly Sick.
—	—	—	—	—	·1	—	—	·01
92·43	11·0	·10	—	·96	5·6	·06	—	·65
17·25	6·1	—	—	·18	16·1	·03	—	·44
2·37	·5	·04	—	·02	·7	·02	—	·05
15·11	·9	·21	—	·16	1·3	·25	—	·21
13·50	3·7	·01	—	·14	4·1	·01	—	·15
·05	—	—	—	—	—	—	—	—
4·15	·5	·01	·05	·04	·6	·02	·04	·06
—	—	—	—	—	—	—	—	—
19·27	5·2	·02	·01	·20	6·1	·01	·02	·22
3·69	·6	·03	—	·04	1·8	·08	—	·12
40·92	2·4	·52	1·44	·42	3·8	·85	1·91	·60
327·42	33·3	—	—	3·39	59·2	—	·01	5·60
316·11	30·2	·06	1·04	3·27	35·9	·05	·87	3·55
464·99	64·0	—	·16	4·82	86·2	—	·05	5·88
—	—	—	—	—	—	—	—	—
73·75	23·6	·01	—	·76	26·3	—	—	·74
·02	—	—	—	—	·1	—	—	—
5·33	1·6	·02	—	·06	2·2	·03	·01	·07
167·57	26·1	·07	·64	1·74	34·6	·05	·64	2·19
49·19	6·8	—	·92	·51	7·2	·01	·90	·50
36·56	5·6	·11	·42	·38	5·2	·12	·19	·35
48·09	6·5	·19	1·27	·50	7·2	·30	1·13	·49
18·30	1·3	·02	·88	·19	1·3	·02	·90	·23
65·66	11·0	—	·87	·68	11·4	—	·69	·69
63·81	9·4	·02	1·44	·66	7·8	·01	·85	·50
104·68	10·9	·36	3·74	1·08	9·9	·37	3·50	·96
229·37	46·0	·56	·74	2·38	60·2	1·16	·81	3·02
305·83	94·1	·18	1·82	3·17	105·7	·32	·98	3·20
105·93	9·9	—	·14	1·10	15·8	·01	·12	1·70
19·96	1·9	·12	·38	·21	2·2	·14	·27	·20
162·19	24·1	·01	·39	1·68	34·2	·01	·29	2·24
89·10	12·8	·02	2·01	·92	8·3	·02	1·06	·66
101·92	24·3	·01	·06	1·06	23·6	·01	·08	1·05
222·47	52·1	—	·29	2·30	46·3	—	·21	2·01
2·86	·4	·28	·02	·03	·2	·35	·01	·01
457·86	110·0	·37	1·12	4·74	98·5	·32	·73	4·06
—	—	—	—	—	—	—	—	—
·97	·1	·06	·02	·01	·1	·05	—	·01
14·19	3·7	—	—	·15	3·1	—	—	·10
—	—	—	—	—	—	—	—	—
3,662·96	640·6	3·42	19·87	37·96	785·9	4·68	16·27	42·51

* These ratios are calculated on the strength including men detached.

Egypt and Cyprus.

(*continued.*)

1897.	Constantly Sick.	Ratios per 1,000 of Strength.				
		Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
Egypt	237·66	733·2	8·32	12·36	7·64	54·90
Cyprus	5·29	566·7	8·33			44·08
Command	242·95	728·7	8·31	12·36	7·64	54·61

The ratios of admission, mortality, and constantly sick for the whole Command are lower than in 1896 by 93·6, 4·97, and 8·52, and than the average ratios for the preceding ten years by 270·1, 2·77, and 10·87 per 1,000 respectively. The average sick time to each soldier, 19·93 days, is shorter than in the previous year by 3·18, and than the average period for the ten years 1887–96 by 3·97 days. The average duration of each case of sickness was 27·35 days, which is shorter in the former comparison by three-quarters of a day, but longer than the average period by 3·42 days.

Taking Egypt alone, the admission, death, and constantly sick rates have declined by 80·7, 5·41, and 8·47 per 1,000, as compared with 1896, and by 301·4, 3·67, and 13·39 per 1,000 respectively, as compared with the decennial average ratios. The average sick time to each soldier was 20·04 days, which is shorter than in the previous year by 3·15, and than the average period for the preceding ten years by 4·89 days. The average duration of each case of sickness, 27·33 days, is 1·17 days shorter than in the previous year, but 3·24 days longer than the average.

The health statistics of the two stations in Egypt occupied by British troops are given below :—

Stations.	Average Strength.	Admissions.	Deaths.	Ratios per 1,000.	
				Admissions.	Deaths.
Cairo	3,186	2,146	24	673·6	7·53
Alexandria	1,143	1,028	11	899·4	9·62

The admission and mortality ratios were higher for Alexandria than for Cairo, which has not been the case since 1894. Comparing these ratios in each station with those for 1896, it is found that the admission and mortality rates have declined in Cairo, by 151·5 and 8·28, but have increased in Alexandria by 122·6 and 2·79 per 1,000 respectively.

In Cyprus the admission rate is lower than in the previous year by 503·6, and than the decennial average rate by 150·0 per 1,000. The death rate is higher than the average rate by 4·41, while in 1896 it was *nil*. The constantly sick rate is lower than that for the preceding year by 11·94, but higher than the average rate by 1·31. The average sick time to each soldier, 16·09 days, is shorter than in 1896 by 4·41 days, but about half a day longer than the average period for the ten years 1887–96, the average duration of each case of sickness being longer in the two comparisons by 9·24 and 6·61 days.

In Abstract No. XXVI is a table showing these statistics for the various regiments and corps which served in the Command during the year.

In the Cavalry the admission, mortality and constantly sick rates were ·8, 8·08, and 62·55 per 1,000 respectively, as compared with 909·8, 4·01,

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK among the Ratios per 1,000 of the Strength, and the Average Ratios for 10 Years.

Average Number constantly Sick.	Ratio per 1,000.				Average Ratio per 1,000 from 1887 to 1896.			
	Admissions.	Deaths.*	Invalids finally discharged.*	Constantly Sick.	Admissions.	Deaths.*	Invalids finally discharged.*	Constantly Sick.
—	—	—	—	—	·1	—	—	·01
92·43	11·0	·10	—	·96	5·6	·06	—	·65
17·25	6·1	—	—	·18	16·1	·03	—	·44
2·37	·5	·04	—	·02	·7	·02	—	·05
15·11	·9	·21	—	·16	1·3	·25	—	·21
13·59	3·7	·01	—	·14	4·1	·01	—	·15
·05	—	—	—	—	—	—	—	—
4·15	·5	·01	·05	·04	·6	·02	·04	·06
—	—	—	—	—	—	—	—	—
19·27	5·2	·02	·01	·20	6·1	·01	·02	·22
3·69	·6	·03	—	·04	1·8	·08	—	·12
40·92	2·4	·52	1·44	·42	3·8	·85	1·91	·60
327·42	33·3	—	—	3·39	59·2	—	·01	5·60
316·11	30·2	·06	1·04	3·27	35·9	·05	·87	3·55
464·99	64·0	—	·16	4·82	86·2	—	·05	5·88
—	—	—	—	—	—	—	—	—
73·75	23·6	·01	—	·76	26·3	—	—	·74
·02	—	—	—	—	·1	—	—	—
5·33	1·6	·02	—	·06	2·2	·03	·01	·07
167·57	26·1	·07	·64	1·74	34·6	·05	·64	2·19
49·19	6·8	—	·92	·51	7·2	·01	·90	·50
36·56	5·6	·11	·42	·38	5·2	·12	·19	·35
48·09	6·5	·19	1·27	·50	7·2	·30	1·13	·49
18·30	1·3	·02	·88	·19	1·3	·02	·90	·23
65·66	11·0	—	·87	·68	11·4	—	·69	·69
63·81	9·4	·02	1·44	·66	7·8	·01	·85	·50
104·68	10·9	·36	3·74	1·08	9·9	·37	3·50	·96
229·37	46·0	·56	·74	2·38	60·2	1·16	·81	3·02
305·83	94·1	·18	1·82	3·17	105·7	·32	·98	3·20
105·93	9·9	—	·14	1·10	15·8	·01	·12	1·70
19·96	1·9	·12	·38	·21	2·2	·14	·27	·20
162·19	24·1	·01	·39	1·68	34·2	·01	·29	2·24
89·10	12·8	·02	2·01	·92	8·3	·02	1·06	·65
101·92	24·3	·01	·06	1·06	23·6	·01	·08	1·05
222·47	52·1	—	·29	2·30	46·3	—	·21	2·01
2·86	·4	·28	·02	·03	·2	·35	·01	·01
457·86	110·0	·37	1·12	4·74	98·5	·32	·73	4·06
—	—	—	—	—	—	—	—	—
·97	·1	·06	·02	·01	·1	·05	—	·01
14·19	3·7	—	—	·15	3·1	—	—	·10
—	—	—	—	—	—	—	—	—
3,662·96	640·6	3·42	19·87	37·95	735·9	4·68	16·27	42·51

* These ratios are calculated on the strength including men detached.

ABSTRACT A.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS among the TROOPS stationed in ENGLAND during the Year 1897, with

Average Strength in Annual Returns, 71,374. Average Strength, including Men detached, 71,783. Diseases.	Admissions into Hospital.	Died. With the regiment.	Died. Absent from the regiment.	Died. Total.	Invalids Discharged the Service.	Average Number constantly Sick.
GENERAL DISEASES.						
Small-pox	—	—	—	—	—	—
Other Eruptive Fevers	881	9	—	9	—	80·93
Influenza	470	—	—	—	—	12·95
Diphtheria	41	3	—	3	—	2·26
Enteric Fever...	42	12	1	13	—	7·95
Other continued Fevers	264	1	—	1	—	9·67
Cholera	—	—	—	—	—	·05
Dysentery	41	1	—	1	4	3·74
Yellow Fever	—	—	—	—	—	—
Malarial Fevers	428	2	—	2	1	16·38
Septic Diseases	42	2	—	2	—	2·84
Tubercular Diseases...	176	35	4	39	103	30·78
Syphilis, Primary	2,339	—	—	—	—	247·47
,, Secondary	2,283	5	—	5	77	259·55
Gonorrhœa	4,667	—	—	—	12	352·84
Hydrophobia	—	—	—	—	—	—
Parasitic Diseases	1,691	1	—	1	—	54·75
Scurvy	1	—	—	—	—	·02
Alcoholism	122	1	—	1	—	4·04
Rheumatism	1,937	5	—	5	39	132·35
Debility	502	—	—	—	65	40·27
Other General Diseases	413	9	—	9	26	27·84
LOCAL DISEASES.						
Diseases of the—						
Nervous System { Nervous	439	13	2	15	91	86·94
Nervous System { Mental	84	1	—	1	59	12·00
Eye	761	—	—	—	69	50·24
Other Organs of Special Sense	676	2	—	2	91	47·24
Circulatory System	759	22	4	26	261	79·04
Respiratory ,, ...	3,463	37	3	40	51	176·43
Digestive ,, ...	6,998	9	1	10	127	231·73
Lymphatic ,, ...	729	—	—	—	9	83·58
Urinary ,, ...	138	9	—	9	25	14·97
Generative ,, ...	1,772	1	—	1	28	126·68
Organs of Locomotion	901	2	—	2	124	65·99
Connective Tissue	1,667	1	—	1	3	72·28
Skin	3,530	—	—	—	17	156·28
INJURIES.						
General	30	23	—	23	2	2·55
Local	7,553	26	1	27	75	333·99
In Action	—	—	—	—	—	—
POISONS	11	6	—	6	1	·68
No appreciable disease	300	—	—	—	—	12·01
Cause unknown (refers to deaths only)	—	—	—	—	—	—
General Total	46,151	238	16	254	1360	2789·31

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK the Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.				Average Ratio per 1,000 from 1887 to 1896.			
Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly Sick.	Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly Sick.
—	—	—	—	·1	—	—	·01
12·3	·13	—	1·13	10·1	·06	—	·77
6·6	—	—	·18	17·4	·03	—	·48
·6	·04	—	·03	·9	·02	—	·06
·6	·18	—	·11	·9	·19	—	·15
3·7	·01	—	·14	3·5	—	—	·13
—	—	—	—	—	—	—	—
·6	·01	·04	·05	·7	·02	·04	·07
—	—	—	—	—	—	—	—
6·0	·03	·01	·23	7·4	·01	·02	·27
·6	·03	—	·04	1·9	·09	·01	·13
2·5	·51	1·44	·43	3·9	·86	1·38	·62
32·8	—	—	3·47	64·4	—	·01	6·13
32·0	·07	1·07	3·64	38·9	·05	·96	3·95
65·4	—	·17	4·94	89·5	—	·06	6·14
—	—	—	—	—	—	—	—
23·7	·01	—	·77	27·5	—	—	·78
—	—	—	—	—	—	—	—
1·7	·01	—	·06	2·3	·04	—	·08
27·1	·07	·51	1·85	36·7	·06	·36	2·33
7·0	—	91	·56	7·3	·01	·90	·50
5·8	·13	·36	39	5·4	·13	21	·37
6·2	·21	1·27	·52	7·5	·31	1·18	·51
1·2	·01	·82	·17	1·2	·02	·82	·20
10·7	—	·96	·70	11·3	—	·70	·68
9·5	·03	1·27	·66	8·3	·01	·90	·53
10·6	·36	3·64	1·11	10·0	·38	3·67	1·00
48·5	·56	·71	2·47	61·5	1·20	·80	3·08
98·0	·14	1·77	3·25	110·5	·33	1·00	3·85
10·2	—	·13	1·17	16·8	·01	·12	1·83
1·9	·13	·35	·21	2·2	·14	·26	·20
24·8	·01	·39	1·78	35·0	·01	·31	2·37
12·6	·03	1·73	·92	8·0	·02	1·11	·65
23·4	·01	·04	1·01	23·4	·02	·08	1·06
49·5	—	·24	2·19	45·8	—	·21	1·99
·4	·32	·03	·04	·3	·32	·01	·02
105·8	·38	1·04	4·68	96·8	·32	·77	4·06
—	—	—	—	—	—	—	—
·1	·08	·01	·01	·1	·03	—	·01
4·2	—	—	·17	3·4	—	—	·11
—	—	—	—	—	—	—	—
646·6	3·52	18·94	39·08	760·9	4·71	16·79	44·62

* These ratios are calculated on the strength including men detached.

Egypt and Cyprus.

for venereal diseases was 247·7 per 1,000, which is lower than that for 1896 by 72·8, and than the average rate for the preceding ten years by 54·5, the constantly sick rate, 23·95 per 1,000, being lower by 1·81 in the former comparison, but higher by ·22 in the latter.* In Cairo the admission ratio for all classes of venereal diseases was 212·8, and the constantly sick rate 21·26, which are lower than those for 1896 by 86·2 and 2·51 respectively. The corresponding ratios for Alexandria were 356·9 and 32·37, as compared with 364·5 and 31·15 in the previous year, and for Cyprus 133·3 and 15·33 per 1,000, as against 507·8 and 34·30.

For *parasitic diseases* there were 27 admissions, equal to a ratio of 6·1 per 1,000, which is less than the average rate by 2·9. Among the cases were 17 of scabies and 6 of tænia solium.

Alcoholism caused 10 admissions, of which 3 were for delirium-tremens. In 1896 there were 8 admissions, including 2 for delirium-tremens, of which one proved fatal.

Rheumatism.—There were 84 admissions, including 6 for rheumatic fever, the equivalent ratio being 18·9 per 1,000, which is less than that for 1896 by 5·4, and than the average rate by 5·3. There was no death.

Debility caused 13 admissions, or a ratio of 2·9 per 1,000, as compared with 19·4 in the previous year and with 16·6 the average rate.

The cases returned under the heading of *other general diseases* comprised 12 of non-malignant new growth and 3 of anæmia, and there was one fatal case of idiopathic anæmia at Cyprus.

LOCAL DISEASES.—*Diseases of the Nervous System* were the cause of 17 admissions and 2 deaths. The admission rate was 3·8 per 1,000, which is lower than that for the previous year by 1·6 and than the average rate by 5·4. The cases were 7 of neuralgia, 3 of paralysis, 2 of epilepsy, one each of degeneration of spinal cord, meningitis (fatal), abscess of brain (fatal), dementia, and delusional insanity.

Diseases of the Eye.—95 admissions are returned, equal to a ratio of 21·4 per 1,000, which is above the previous year's rate by 3·3, but below the average rate by 12·8. Of the cases, 89 were returned as conjunctivitis.

Diseases of other Organs of Special Sense, with 57 admissions, gave a ratio of 12·8 per 1,000, which is higher than that for 1896 by 1·1, but below the decennial average rate by 1·3. Inflammation of the external meatus furnished all but 7 of the cases.

Diseases of the Circulatory System.—There were 22 admissions with 2 deaths. The admission rate was 5·0 per 1,000, which is less than the previous year's ratio by 2·2 and than the average rate by 4·3. The cases were 11 of disordered action of the heart, 4 of varix, 3 of valvular disease of the heart, 3 of phlebitis and one of aneurysm of aorta. Both deaths were from the last-named disease, one being a death out of hospital, and therefore not shown as an admission.

Diseases of the Respiratory System caused 90 admissions and 5 deaths, the admission rate being 20·2 per 1,000, which is less than that for the preceding year by 5·1, and than the average rate for the ten years 1887–96 by 15·3. There were 42 cases of bronchitis, 36 of pneumonia with 4 deaths, 6 of pleurisy, 2 each of laryngitis and hæmorrhage of lung, 1 of empyema, and 1 (fatal) of phthisis.

Diseases of the Digestive System gave 313 admissions and 4 deaths, the admission rate, 70·4 per 1,000, comparing favourably with 106·7 in 1896, and with 124·6 the average rate. Of the admissions, 148 were due to affections of the mouth and throat, among the remainder being 66 of hepatic disorder, 30 of diarrhœa, 22 of dyspepsia, and 20 of colic. There were 2 cases of abscess of the liver. One occurred at Cairo, and was operated upon by excision of a portion of rib and drainage, but eventually died. In the second case there was no operative interference. The case occurred in Cyprus, and was transferred to Cairo, whence he was invalided home. The other deaths were due to ulceration of intestines, hepatitis, and acute yellow atrophy of liver.

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* There were no admissions for ulcer of penis.

Egypt a Cyprus.

Diseases of the Lymphatic System.—There were 62 admissions, the equivalent ratio being 13·9 per 1,000, which is lower than the previous year's rate by 1·4 and than the average rate by 7·3. The cases were 60 of inflammation and 2 of suppuration of the lymphatic glands.

Diseases of the Urinary System caused 3 admissions, the ratio, ·7 per 1,000, being practically the same as in the previous year, but ·9 below the average rate. There was one admission each for acute nephritis, abscess of kidney, and incontinence of urine.

Diseases of the Generative System, with 422 admissions, gave a ratio of 94·9 per 1,000, which is above that for 1896 by 1·2, but below the average rate for the preceding ten years by 17·1. Soft chancre caused 385 of the admissions, and among the remainder were 26 of orchitis.

For *diseases of the organs of locomotion* there were 45 admissions, or 10·1 per 1,000, as compared with 7·7 in 1896 and with 8·8 the average rate. Synovitis was the chief cause of admission.

Diseases of the Connective Tissue caused 73 admissions, the equivalent ratio being 16·4 per 1,000, which is lower than that for the previous year by 1·2 and than the average rate by 9·8.

Diseases of the Skin gave an admission ratio of 39·1 per 1,000, which is below the decennial average rate by 7·6. Ulcers, boils, eczema and whitlows furnished the greater portion of the 174 admissions.

INJURIES.—The ratio of admission was 66·5, and that of mortality 2·02 per 1,000, the former being higher than the previous year's rate by 1·3, but lower than the ten years' average rate by 24·2, while the latter is higher in both comparisons by ·23 and ·91 respectively. There were 8 admissions for *general injury*, all due to multiple injuries caused by falls from windows and raised verandahs at Cairo. Two of these proved fatal. The medical officer in charge of the station hospital at Cairo reports that these accidents generally occur at night through men, the worse for liquor, endeavouring to urinate from the windows of the barrack rooms, and strongly recommends that the windows should be barred to prevent these accidents.

There were also 2 deaths from drowning; one case was that of a man who was accidentally drowned whilst bathing at Alexandria. The other case was found drowned in the Nile at Cairo.

Under *local injuries* 288 admissions and 5 deaths are returned, the admissions including 91 for sprains, 84 for wounds, 59 for contusions, 20 for abrasions, and 15 cases of fracture. There were 3 deaths from gunshot wounds. One was caused by an accident on the range, the nickel casing of a bullet striking the marker, and causing a wound of the heart; one was a case of murder, the man being shot with a Lee-Metford rifle, and in the third the man committed suicide "by shooting himself through the head with a revolver while in a state of temporary insanity." The remaining deaths were one from dislocation of spine by hanging (judicial) and one from fracture of skull sustained by a fall from a window.

INVALIDING.—There were 55 men invalided home during the year, equal to a ratio of 12·36 per 1,000, which is higher than that for 1896 by 3·17, but lower than the average ratio for the preceding ten years by 6·68. Forty-five of the invalids came from Cairo, or a ratio of 14·12 per 1,000, as compared with 9·96 in the previous year, and 10 from Alexandria, the ratio, 8·75 per 1,000, being higher than that for 1896 by ·78. The highest invaliding rate in any arm of the service was 20·20 in the Cavalry, followed by 16·13 in the Garrison Staff and Departments, 11·90 in the Artillery, and 11·30 in the Infantry, as compared with 12·02, 3·32, 15·67, and 8·57 respectively in the previous year. There was no invaliding in the Royal Engineers, the ratio for 1896 being 8·85 per 1,000. In individual corps with an average strength of over 100 men the highest invaliding ratio was 76·92 per 1,000 in the 1st Battalion Gloucestershire Regiment, the next highest being 18·18 in the 21st Lancers. There was no invaliding in the 1st Battalion Cameron Highlanders; excluding this corps and the Royal Engineers, the lowest ratios were 3·28 in the 1st Battalion Lincolnshire Regiment and 3·50 in the 1st Battalion Warwickshire Regiment. As to the ages of the men invalided,* 1 man, or

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* See table on p. 229.

Egypt and Cyprus.

6·45 per 1,000, was under 20 years of age, 32 men, or 12·62 per 1,000, were between 20 and 25, 16 men, or 11·92 per 1,000, were between 25 and 30, 2 men, or 7·25 per 1,000, were between 30 and 35, 3 men, or 27·27 per 1,000, were between 35 and 40, and 1 man, or 33·33 per 1,000, was more than 40 years of age. Compared with corresponding ratios for 1896, a decrease has occurred in the invaliding rate of men between 30 and 35, but increase is observed in the remainder. Taking service in the Command, 22 men, or 8·32 per 1,000, were in their first year, 25 men, or 20·70 per 1,000, were in their second, 1 man, or 389 per 1,000, was in his third, 4 men, or 31·01 per 1,000, were in their fourth, and 2 men, or 12·35 per 1,000, were in their fifth year, while 1 man, or 20·41 per 1,000, had been more than five years in the Command. In the previous year the invaliding rate was highest among men in their third year. The principal causes of invaliding were tubercular disease of the lungs 10 cases, or 2·25 per 1,000; diseases of the circulatory system 8 cases, or 1·80 per 1,000 (of which 6 cases were invalided on account of valvular disease, and 2 for disordered action of the heart); injuries 7 cases, or 1·57 per 1,000; diseases of the nervous system 5 cases, or 1·12 per 1,000 (of which 3 cases, or ·67 per 1,000, were due to mental affection); secondary syphilis 5 cases, or 1·12 per 1,000; diseases of the digestive system 4 cases, or ·90 per 1,000, and aural affections 3 cases, or ·67 per 1,000.

The number of men discharged the service as medically unfit was 34, the equivalent ratio being 7·64 per 1,000, which is higher than that for the previous year by ·24, but lower than the decennial average rate by 4·45. The chief causes of discharge were tubercular disease of the lung 8 cases, or 1·80 per 1,000; diseases of the circulatory system (including 1 for disordered action of the heart) and injuries, each 5 cases, or 1·12 per 1,000; secondary syphilis 3 cases, or ·67 per 1,000; diseases of the nervous system 3 cases, or ·67 per 1,000, including one case of mental disorder; and diseases of the ear and of the digestive system each 2 cases, or ·45 per 1,000.

Two recruits presented themselves during the year, one being found unfit on account of being under chest measurement.

Officers.—The average strength was 139, and there were 77 cases of sickness, 4 deaths, and 7 cases of invaliding, the corresponding ratios being 554·0, 28·78, and 50·36 per 1,000, as compared with 482·3, 21·28, and 49·64 respectively in 1896. The admissions included 18 for simple continued fever, 8 for injuries, and 4 each for influenza, dysentery, rheumatism and diarrhœa. There were two cases of enteric fever, one at Alexandria and one at Cairo, but no definite cause is assigned in either case. The deaths were one each from melancholia, clots in the heart, ulcer of intestines and gunshot wound. The last was suicidal, the court of inquiry being of opinion that the officer was at the time in a condition of temporary insanity. There were 3 officers invalided for enteric fever, 2 for dysentery, and one each for secondary syphilis and fracture.

Women.—In an average strength of 217, there were 215 cases treated (exclusive of 51 of parturition), being in the ratio of 990·8 per 1,000, which is little more than one-half the rate for 1896. There were 5 deaths, or 23·04 per 1,000, as compared with 5·32 in the previous year. The cases included 1 each of small-pox and enteric fever, 48 of simple continued fever, 28 of debility, 25 of diseases peculiar to women, 24 of conjunctivitis, and 11 of bronchitis. The deaths were one each from small-pox, diphtheria, enteric fever, and puerperal septicæmia at Cairo, and one from multiple neuritis at Alexandria.

Children.—There were 618 admissions and 216 deaths in an average strength of 375, the equivalent ratios being 1648·0 and 69·33 per 1,000, the former being lower by 109·7 and the latter higher by 35·90 than corresponding ratios for 1896. The principal causes of sickness were chicken-pox 2 cases, scarlet fever 9, diphtheria 2, simple continued fever 60, dysentery 11, debility 28, conjunctivitis 224, bronchitis 74, sore throat 33, and diarrhœa 55. The deaths were 6 from disorders of dentition, 6 from diarrhœa, 3 from tubercular diseases, 2 each from diphtheria, bronchitis, and intestinal dyspepsia, and 1 each from chicken-pox, whooping cough, debility, infantile convulsions, and boil.

VACCINATION.—Of 43 primary vaccinations among the children 6 were failures. There were 161 re-vaccinations among the men, 6 among the women, and 20 among the children, failures resulting in 122, 2, and 6 instances respectively. All the operations were performed with preserved lymph. The percentage of failures in re-vaccination in Cairo was 62·5, and it is thought that this may be due to the rapid deterioration of the lymph remarked upon in the report for the previous year.

SANITARY CONDITIONS.

The Principal Medical Officer (Surgeon-Major-General H. S. Muir, M.D.) reports that the sanitary condition of the various barracks, hospitals, &c., has been generally satisfactory. In the *Cairo* district several improvements have been carried out in the *Citadel Barracks*, notably the relaying of the drainage system and the removal of old buildings at the back, which obstructed light and air. Additional means of ventilation (foul air extractors) have been provided to several of the barrack rooms. As regards the hospital, it has been found that the lighting is insufficient. The number of lamps allowed is by regulated scale, but "some of the wards are of enormous size, while all of them are very lofty, and what would be sufficient illumination in an ordinary hospital is here only enough to make darkness visible."

At the *Kasr-el-Nil Barracks* the disposal of waste water from the lavatories and laundries was alluded to last year. The cess-pits which collect the water appear to be satisfactory so far. The Principal Medical Officer mentioned that there might be unpleasant consequences if the rising of the Nile so saturated the soil as to prevent percolation; but for the second year in succession the Nile's rise was much below the average. The level of the barrack square has been raised two feet. It would be desirable to have Pasteur-Chamberland filters at these barracks, but the pressure of water in the upper stories is not sufficient. Meanwhile the Royal Engineers have been boring for water in the barrack square, and have been successful in obtaining excellent water. Further experiments are necessary to see if the quantity available is adequate. The married quarters in these barracks are considered insufficient, and to prevent overcrowding married families are accommodated in the Citadel and at Abbassiyeh.

At *Abbassiyeh* the new drainage scheme, with new slop sinks, baths, and accessories, has been completed. The medical officer in charge notes that bars have been placed across the windows, and that no accidents have occurred there since.

The use of Pasteur-Chamberland filters has been extended in the barracks in Cairo. Where they are not yet available, the water is boiled.

In the *Alexandria* district several minor sanitary improvements have been carried out. The Principal Medical Officer notes that the hospital at *Ras-el-Tin* is in a very satisfactory condition. The situation is excellent, and could hardly be improved upon, but the distance from Mustapha Camp is very great for the transport of sick men. An excellent site could be found for a hospital at Mustapha.

The barracks at Ras-el-Tin he reports to be objectionable from their mode of construction and general want of repair.

At *Mustapha Camp* the system of emptying catch-pits by buckets is not as satisfactory as could be wished, as a certain amount of uncleanliness is inevitable. The use of the "*tonneau*," or hand pump, has been recommended. Pasteur filters are in use, but the mode of distribution of water is not satisfactory. The water is kept for each hut in earthenware basins, which are supposed to be kept covered, but which are practically often left open, allowing sand and dust to be blown into them. If some means could be devised to prevent this it would be a great advantage. With regard to the working of the filters, it has been pointed out that every now and then leakage is liable to take place, not only in the candles but also at the junction of the candles with the pipes. To secure perfect results, then, the water from every filter should be occasionally tested for bacteria. It might not be necessary to have

ABSTRACT D. TABLE showing the AVERAGE STRENGTH, SICKNESS
UNITED KINGDOM during the year 1897,

Average Strength.	Officers, 4,001.			
Diseases.	Attacks of Illness.	Deaths.	Ratio per 1,000.	
			Attacks.	Deaths.
GENERAL DISEASES.				
Small-pox	—	—	—	—
Other Eruptive Fevers	21	—	5·2	—
Influenza	138	1	34·5	·25
Diphtheria	—	—	—	—
Enteric Fever	3	1	·8	·25
Other Continued Fevers	35	—	8·7	—
Cholera	—	—	—	—
Dysentery	6	—	1·5	—
Malarial Fevers...	53	—	13·2	—
Septic Diseases	2	1	·5	·25
Tubercular Diseases	—	—	—	—
Syphilis, Primary	2	—	·5	—
,, Secondary	1	—	·3	—
Gonorrhœa	9	—	2·3	—
Hydrophobia	—	—	—	—
Parasitic Diseases	—	—	—	—
Scurvy	—	—	—	—
Alcoholism	—	—	—	—
Rheumatism	54	—	13·5	—
Debility	10	—	2·5	—
Other General Diseases	15	3	3·8	·75
LOCAL DISEASES.				
Diseases of the—				
Nervous System { Nervous	18	1	4·5	·25
Nervous System { Mental	2	—	·5	—
Eye	12	—	3·0	—
Other Organs of Special Sense...	5	—	1·3	—
Circulatory System	10	3	2·5	·75
Respiratory ,, ...	140	1	35·0	·25
Digestive ,, ...	203	2	50·7	·50
Lymphatic ,, ...	12	—	3·0	—
Urinary ,, ...	19	—	4·7	—
Generative ,, ...	19	—	4·7	—
Organs of Locomotion	65	—	16·2	—
Connective Tissue	33	—	8·2	—
Skin	40	—	10·0	—
INJURIES.				
General	3	—	·8	—
Local	263	3	65·7	·75
In Action...	—	—	—	—
POISONS	1	1	·3	·25
No appreciable disease	—	—	—	—
General Total	1,194	17	298·4	4·25

and MORTALITY among the OFFICERS, WOMEN, and CHILDREN in the
with the Ratios per 1,000 of the Strength.

Women, 11,122.				Children, 21,764.			
Attacks of Illness.	Deaths.	Ratio per 1,000.		Attacks of Illness.	Deaths.	Ratio per 1,000.	
		Attacks.	Deaths.			Attacks.	Deaths.
—	—	—	—	—	—	—	—
37	2	3·2	·18	2,342	48	107·6	2·20
197	—	17·7	—	136	1	6·2	·05
6	—	·5	—	164	17	7·5	·78
10	—	·9	—	13	1	·6	·05
24	—	2·1	—	145	—	6·7	—
—	—	—	—	—	—	—	—
8	—	·7	—	5	2	·2	·09
53	—	4·8	—	57	—	2·6	—
21	4	1·9	·36	13	2	·6	·09
43	6	3·9	·54	67	23	3·1	1·06
—	—	—	—	—	—	—	—
10	—	·9	—	16	3	·7	·14
1	—	·1	—	—	—	—	—
—	—	—	—	—	—	—	—
11	—	1·0	—	231	—	10·6	—
—	—	—	—	—	—	—	—
2	—	·2	—	—	—	—	—
152	—	13·7	—	53	1	2·4	·05
708	1	63·7	·09	414	21	19·0	·96
117	6	10·5	·54	881	54	40·5	2·48
159	3	14·3	·27	200	58	9·2	2·66
5	—	·4	—	—	—	—	—
43	—	3·9	—	191	—	8·8	—
14	—	1·2	—	89	—	4·1	—
79	2	7·1	·18	13	1	·6	·05
549	7	49·4	·63	3,464	123	159·2	5·65
781	5	70·2	·45	2,145	78	98·6	3·58
9	—	·8	—	123	—	5·7	—
21	4	1·9	·36	16	2	·7	·09
521	4	46·8	·36	13	—	·6	—
32	—	2·9	—	44	1	2·0	·05
63	—	5·7	—	172	1	7·9	·05
103	—	9·3	—	481	—	22·1	—
—	—	—	—	8	5	·4	·23
73	1	6·6	·09	511	1	23·5	·05
—	—	—	—	—	—	—	—
—	—	—	—	1	—	—	—
—	—	—	—	—	—	—	—
3,852	45	346·3	4·05	12,008	443	551·7	20·36

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Diseases of the Eye with 12 admissions, all for conjunctivitis, gave a ratio of 12·1 per 1,000, which is fractionally higher than that for 1896. There were 6 admissions for *diseases of other organs of special sense*, all due to aural affection, the ratio, 6·0 per 1,000, differing little from that for the previous year. For *diseases of the circulatory system* there were 2 admissions, the ratio being 2·0 per 1,000, as compared with 4·4 in 1896. There was a death from fatty degeneration of the heart. *Diseases of the respiratory system* gave 54 admissions and 2 deaths. The admission ratio, 54·3 per 1,000, is above that for the previous year by 18·0. The cases included 37 of bronchial affections, 14 of pneumonia, 2 of pleurisy, and 1 of laryngitis. Both the deaths were due to pneumonia. *Diseases of the digestive system* caused 101 admissions and 1 death, the admission ratio being 101·5 per 1,000, which is below the previous year's rate by 47·9. Affections of the mouth and throat caused 65 of the admissions, and dyspepsia and diarrhœa contributed the greater number of the remaining cases. The death was due to peritonitis. *Diseases of the lymphatic system* caused 11 admissions, the ratio, 11·0 per 1,000, being lower than in 1896 by 6·7. For *diseases of the urinary system* 2 admissions are returned, namely, one for Bright's disease and one for cystitis. *Diseases of the generative system* were the cause of 106 admissions, the equivalent ratio being 106·5 per 1,000, as compared with 58·4 in 1896. Soft chancre was the chief cause of admission, and among the remainder there were 22 cases of balanitis, 9 of ulcer of penis, and 7 of orchitis. For *diseases of the organs of locomotion* there were 4 admissions, the ratio, 4·0 per 1,000, being higher than in the previous year by ·5. *Diseases of the connective tissue*, with an admission rate of 26·1 per 1,000, show an increase of 4·0 on the previous year's rate. For *diseases of the skin* there were 53 admissions, including 24 for boils, 8 each for whitlows and eczema, and 7 for ulcers, the ratio being 53·3 per 1,000.

INJURIES.—There were 90 admissions, the ratio being 90·4 per 1,000, an increase of 17·1 on that for 1896. Of 4 admissions returned under the heading of *general injuries*, 2 were due to heat-stroke and 1 each to sunstroke and heat apoplexy. The case of heat apoplexy occurred on the s.s. "Nubia," on October 2nd, in the Gulf of Aden, the two admissions for heat stroke taking place on the same vessel and during the same voyage. The case of sunstroke was admitted on the s.s. "Borneo," which left London for Ceylon on December 13th. There were 86 admissions for *local injuries*, chiefly caused by contusions, wounds, and sprains.

OFFICERS.—The number of officers embarked was 724, among whom 8 cases of sickness occurred.

WOMEN AND CHILDREN.—The number of women embarked was 908, no casualties occurring among them. Amongst 1,243 children embarked, there were 2 deaths, one being due to measles and the other to pneumonia.

II.—TROOPS RETURNING HOME FROM ABROAD.

The number of effective warrant officers, non-commissioned officers and men who embarked for England was 13,609, the equivalent annual strength being 799. The admissions into hospital numbered 928, and there were 7 deaths, equal to ratios of 1161·4 and 8·76 per 1,000. The admission rate is higher than in 1896 by 33·4 and than the average rate for the preceding ten years by 20·1, the death rate being lower by ·68 in the former comparison, and by 1·78 in the latter.

The admissions and deaths, arranged according to the various sections of disease, are shown in Abstract No. XXIII.

GENERAL DISEASES.—There were 2 admissions for *small-pox*, with 1 death. The fatal case was of the confluent type, and occurred on the transport "Britannia" in February, nine days after leaving Bombay for England, death taking place eleven days afterwards. The man is stated to have had good marks of primary vaccination and a modified one of re-vaccination.

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The other case occurred on board the transport "Victoria" early in March, the patient having embarked at Bombay. He was landed at Aden. Every precaution was taken in each case, and no further admissions occurred on either vessel.

Enteric fever caused one admission, namely, in October, on the transport "Nubia." The disease was supposed to have been contracted in India.

Other continued fevers gave 7 admissions, 6 being for simple continued and 1 for Mediterranean fever, the ratio, 8·8 per 1,000, being above that for 1896 by ·7.

Cholera caused 5 admissions and 4 deaths, all on board the P. and O. s.s. "Nubia." This vessel sailed from Colombo on December 17th, 1896, having on board 299 military passengers, and arrived at Port Said on the 29th, where coal and water was taken in. Malta was reached on January 1st, 1897, and on that night a private of the 1st Battalion Loyal North Lancashire Regiment came to hospital suffering from diarrhœa. He was feeling better next morning, but about 4 p.m. on January 2nd he was suddenly attacked with vomiting, purging, and collapse, accompanied by cramps in the limbs, and died four hours later. Another man of the same regiment was also admitted with diarrhœa on January 1st, and was seized with choleraic vomiting shortly after 4 p.m. on January 2nd, but ultimately recovered. A third case was admitted on January 3rd with severe diarrhœa, vomiting, and cramps in the limbs, and, after rallying considerably, died from suppression of urine on January 6th. The fourth case was admitted on January 5th with slight diarrhœa and vomiting, but no cramps. He improved during the two following days, but, suppression of urine occurring, he died on January 9th. The last case was that of a patient in hospital suffering from hepatitis, who occupied the cot above that in which the man first attacked was placed on admission. About 8 a.m. on January 8th he was seized with choleraic vomiting, followed in the afternoon by severe purging, and died, with complete suppression of urine, at 1·30 a.m. on January 10th while the ship was in Plymouth Sound. In addition to the cases of cholera there were also six severe cases of diarrhœa between January 1st and 4th, and three mild cases on the 10th and 11th. On the first death occurring, all the bedding of the patient was destroyed, and disinfection thoroughly carried out. Each subsequent case was segregated and treated in the second-class smoking saloon on the poop. The women and children were placed in the second saloon, and their quarters used as a hospital for cases of diarrhœa. The men's hospital was meanwhile thoroughly scrubbed and disinfected with chloride of lime. All infected bedding was thrown overboard.

The cause of the outbreak was not clearly established, but the following facts are recorded:—There was a severe epidemic of cholera amongst the native population of Colombo at the time the "Nubia" left that port. On December 22nd, five days afterwards, a native fireman died of what is recorded as acute dysentery, after three days' sickness. On the 27th December another native fireman also died of what was recorded as dysentery, his illness lasting only 24 hours. It is not stated whether these men had been on shore at Colombo or not, or had purchased articles of food or drink there, and there is only a vague suspicion that these might have been cholera cases. At Port Said the troops took their serge clothing into wear. It had been customary for the troops at Colombo to wear serge trousers while walking out in the evening, and it would appear that the men attacked were all stationed in Colombo previous to embarkation, and had been permitted to visit the bazars. The cholera cases commenced, as stated above, on the 1st January, or four days after the serge clothing, presumably worn on the occasion of the bazars being visited at Colombo, had been again taken into wear. Finally it is stated that a large quantity of fruit was eaten by the troops at Port Said, but cholera is reported to have been absent from the locality, and had the fruit been the cause of the outbreak it was considered that the disease would not have been confined to the few cases that occurred. On the 12th January, the outbreak having apparently ceased, the troops were landed and isolated at Fort Staddon, the ship proceeding to London, where it was dealt with by the port sanitary authorities. No cases occurred among other occupants of the vessel, or among the troops after disembarkation.

ABSTRACT No. III.—TABLE showing the AVERAGE STRENGTH, ADMISSIO
the TROOPS stationed at MALTA during the Year 1897, with the Rati

Average Strength, 9,175.		Deaths.			Invalids.	
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.
GENERAL DISEASES.						
Small-pox	4	—	—	—	—	—
Other Eruptive Fevers	15	—	—	—	—	—
Influenza	1	—	—	—	—	—
Diphtheria	—	—	—	—	—	—
Enteric Fever	73	32	—	32	6	—
Other Continued Fevers	2482	12	1	13	118	5
Cholera	—	—	—	—	—	—
Dysentery	173	9	—	9	3	2
Yellow Fever	—	—	—	—	—	—
Malarial Fevers	158	—	—	—	2	1
Septic Diseases	6	1	—	1	—	—
Tubercular Diseases	15	3	5	8	13	13
Syphilis, Primary	392	—	—	—	—	—
,, Secondary	220	1	—	1	11	3
Gonorrhœa	825	—	—	—	2	2
Hydrophobia	—	—	—	—	—	—
Parasitic Diseases	55	—	—	—	1	—
Scurvy	—	—	—	—	—	—
Alcoholism	19	1	—	1	—	—
Rheumatism	197	—	—	—	7	1
Debility	80	—	—	—	10	2
Other General Diseases	85	—	—	—	1	1
LOCAL DISEASES.						
Diseases of the—						
Nervous System { Nervous	45	2	—	2	7	6
Nervous System { Mental	10	—	—	—	15	14
Eye	101	—	—	—	1	1
Other Organs of Special Sense	72	—	—	—	9	5
Circulatory System...	60	2	2	4	16	15
Respiratory ,, ...	150	2	—	2	10	4
Digestive ,, ...	927	7	1	8	11	3
Lymphatic ,, ...	78	—	—	—	1	1
Urinary ,, ...	10	—	—	—	—	1
Generative ,, ...	260	—	—	—	2	—
Organs of Locomotion	75	—	—	—	5	4
Connective Tissue	265	—	—	—	—	—
Skin	463	—	—	—	1	2
INJURIES.						
General	12	10	—	10	1	—
Local	707	5	—	5	4	2
In Action	—	—	—	—	—	—
POISONS	4	1	—	1	1	—
No appreciable disease	41	—	—	—	—	—
Cause unknown (refers to deaths only)	—	—	—	—	—	—
General Total	8,080	88	9	97	258	88

to HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK among
r 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.
·4	—	—	—	·06	—	—	—	—	—
1·6	—	—	—	·16	·4	·01	—	—	·02
·1	—	—	—	·00	4·8	—	·01	—	·15
—	—	—	—	—	—	·03	—	—	—
8·0	3·49	·65	—	1·26	6·2	2·23	·74	·03	1·08
270·5	1·42	12·86	·54	13·88	125·6	1·23	5·01	·37	9·82
—	—	—	—	—	—	·01	—	—	—
18·9	·98	·33	·22	1·38	4·1	·18	·12	·04	·34
—	—	—	—	—	—	—	—	—	—
17·2	—	·22	·11	·67	12·9	·15	·29	·04	·64
·7	·11	—	—	·03	·7	·07	—	·01	·06
1·6	·87	1·42	1·42	·31	2·5	·83	1·53	1·32	·46
42·7	—	—	—	4·06	21·3	—	—	—	2·20
24·0	·11	1·20	·33	2·46	15·4	·06	·54	·30	1·77
89·9	—	·22	·22	7·53	71·9	—	·10	·03	5·30
—	—	—	—	—	—	—	—	—	—
6·0	—	·11	—	·24	12·4	—	—	·01	·37
—	—	—	—	—	2·6	—	—	—	—
2·1	·11	—	—	·11	—	·01	—	—	·10
21·5	—	·76	·11	1·74	24·1	·03	·85	·37	1·80
8·7	—	1·09	·22	·73	9·1	—	·91	·79	·88
9·3	—	·11	·11	·62	5·2	·10	·11	·11	·34
4·9	·22	·76	·65	·35	5·8	·16	·73	·72	·39
1·1	—	1·63	1·63	·37	1·7	·03	1·49	1·54	·40
11·0	—	·11	·11	·47	9·9	—	·51	·35	·63
7·8	—	·98	·54	·53	11·1	—	·74	·69	·72
6·5	·43	1·74	1·63	·63	6·1	·19	1·64	1·46	·66
16·3	·22	1·09	·43	1·02	20·7	·55	1·20	·51	1·61
101·0	·87	1·20	·33	3·62	78·7	·55	·54	·26	2·77
8·5	—	·11	·11	·95	8·1	—	·08	·07	·92
1·1	—	—	·11	·14	2·0	·06	·52	·33	·20
28·5	—	·22	—	1·72	38·7	·01	·32	·29	2·74
8·2	—	·54	·43	·56	6·1	·03	·43	·37	·50
23·9	—	—	—	1·21	28·0	·01	·45	·01	1·17
50·5	—	·11	·22	2·44	39·7	—	·14	·07	1·97
1·3	1·09	·11	—	·11	·6	·58	·04	·03	·06
77·1	·54	·43	·22	3·44	87·4	·33	·56	·41	4·00
—	—	—	—	—	—	—	—	—	—
·4	·11	·11	—	·04	·3	·04	—	—	·01
4·5	—	—	—	·29	2·8	—	—	—	·12
—	—	—	—	—	—	—	—	—	—
[illegible]·6	10·57	28·12	9·59	53·13	666·9	7·53	19·20	10·53	44·29

Troops on Board Ship.

OFFICERS, WOMEN, AND CHILDREN.—Among 513 officers embarked there were 6 cases of sickness. 387 women and 766 children were embarked, no death occurring in either class.

IV.—INVALIDS RETURNING TO ENGLAND.

The number of invalids embarked for England from foreign stations was 2,639, equal to an annual strength of 168. There were 9 deaths during the voyage home. The sickness and mortality among these invalids are accounted for in the statistical tables of the Commands from which they were invalided.

V.—SANITARY CONDITION OF SHIPS.

The sanitary condition of the different vessels and the accommodation provided for the troops on the various voyages were generally reported to be satisfactory. Difficulty has, however, been experienced in obtaining proper hospital accommodation for invalids on board hired transports carrying troops, the chief complaints being want of through ventilation and the noise caused by proximity to married quarters, &c.

ABSTRACTS.

ABSTRACT A.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS among the TROOPS stationed in ENGLAND during the Year 1897, with

Average Strength in Annual Returns, 71,374. Average Strength, including Men detached, 71,783.	Admissions into Hospital.	Died.			Invalids Discharged the Service.	Average Number constantly Sick.
Diseases.		With the regiment.	Absent from the regiment.	Total.		
GENERAL DISEASES.						
Small-pox	—	—	—	—	—	—
Other Eruptive Fevers	881	9	—	9	—	80·93
Influenza	470	—	—	—	—	12·95
Diphtheria	41	3	—	3	—	2·26
Enteric Fever...	42	12	1	13	—	7·95
Other continued Fevers	264	1	—	1	—	9·67
Cholera	—	—	—	—	—	·05
Dysentery	41	1	—	1	4	3·74
Yellow Fever	—	—	—	—	—	—
Malarial Fevers	428	2	—	2	1	16·38
Septic Diseases	42	2	—	2	—	2·84
Tubercular Diseases...	176	35	4	39	103	30·78
Syphilis, Primary	2,339	—	—	—	—	247·47
,, Secondary	2,283	5	—	5	77	259·55
Gonorrhœa	4,667	—	—	—	12	352·84
Hydrophobia	—	—	—	—	—	—
Parasitic Diseases	1,691	1	—	1	—	54·75
Scurvy	1	—	—	—	—	·02
Alcoholism	122	1	—	1	—	4·04
Rheumatism	1,937	5	—	5	39	132·35
Debility	502	—	—	—	65	40·27
Other General Diseases	413	9	—	9	26	27·84
LOCAL DISEASES.						
Diseases of the—						
Nervous System { Nervous	439	13	2	15	91	36·94
Nervous System { Mental	84	1	—	1	59	12·00
Eye	761	—	—	—	69	50·24
Other Organs of Special Sense	676	2	—	2	91	47·24
Circulatory System	759	22	4	26	261	79·04
Respiratory ,, ...	3,463	37	3	40	51	176·43
Digestive ,, ...	6,998	9	1	10	127	231·73
Lymphatic ,, ...	729	—	—	—	9	83·58
Urinary ,, ...	138	9	—	9	25	14·97
Generative ,, ...	1,772	1	—	1	28	126·68
Organs of Locomotion	901	2	—	2	124	65·99
Connective Tissue	1,667	1	—	1	3	72·28
Skin	3,530	—	—	—	17	156·28
INJURIES.						
General	30	23	—	23	2	2·55
Local	7,553	26	1	27	75	333·99
In Action	—	—	—	—	—	—
POISONS	11	6	—	6	1	·68
No appreciable disease	300	—	—	—	—	12·01
Cause unknown (refers to deaths only)	—	—	—	—	—	—
General Total	46,151	238	16	254	1360	2789·31

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK the Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.				Average Ratio per 1,000 from 1887 to 1896.			
Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly Sick.	Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly Sick.
—	—	—	—	·1	—	—	·01
12·3	·13	—	1·13	10·1	·06	—	·77
6·6	—	—	·18	17·4	·03	—	·48
·6	·04	—	·03	·9	·02	—	·06
·6	·18	—	·11	·9	·19	—	·15
3·7	·01	—	·14	3·5	—	—	·13
—	—	—	—	—	—	—	—
·6	·01	·04	·05	·7	·02	·04	·07
—	—	—	—	—	—	—	—
6·0	·03	·01	·23	7·4	·01	·02	·27
·6	·03	—	·04	1·9	·09	·01	·13
2·3	·51	1·44	·43	3·9	·86	1·38	·62
32·8	—	—	3·47	64·4	—	·01	6·13
32·0	·07	1·07	3·61	38·9	·05	·96	3·95
65·4	—	·17	4·94	89·5	—	·06	6·14
—	—	—	—	—	—	—	—
23·7	·01	—	·77	27·5	—	—	·78
—	—	—	—	—	—	—	—
1·7	·01	—	·06	2·3	·04	—	·08
27·1	·07	·51	1·85	36·7	·06	·36	2·33
7·0	—	91	·56	7·3	·01	·90	·50
5·8	·13	·36	39	5·4	·13	21	·37
6·2	·21	1·27	·52	7·5	·31	1·18	·51
1·2	·01	·82	·17	1·2	·02	·82	·20
10·7	—	·96	·70	11·3	—	·70	·68
9·5	·03	1·27	·66	8·3	·01	·90	·53
10·6	·36	3·64	1·11	10·0	·38	3·67	1·00
48·5	·56	·71	2·47	61·5	1·20	·80	3·08
98·0	·14	1·77	3·25	110·5	·33	1·00	3·35
10·2	—	·13	1·17	16·8	·01	·12	1·83
1·9	·13	·35	·21	2·2	·14	·26	·20
24·8	·01	·39	1·78	35·0	·01	·31	2·37
12·6	·03	1·73	·92	8·0	·02	1·11	·65
23·4	·01	·04	1·01	23·4	·02	·03	1·03
49·5	—	·24	2·19	45·8	—	·21	1·99
·4	·32	·03	·04	·3	·32	·01	·02
105·8	·38	1·04	4·68	96·8	·32	·77	4·06
—	—	—	—	—	—	—	—
·1	·08	·01	·01	·1	·03	—	·01
4·2	—	—	·17	3·4	—	—	·11
—	—	—	—	—	—	—	—
646·6	3·52	18·91	39·08	760·9	4·71	16·79	44·62

* *These ratios are calculated on the strength including men detached.*

ABSTRACT B.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS among the TROOPS stationed in SCOTLAND during the Year 1897, with

Average Strength in Annual Returns, 3,782.	Admissions into Hospital.	Deaths.			Invalids Discharged the Service.	Average Number constantly Sick.
DISEASES.		With the regiment.	Absent from the regiment	Total.		
GENERAL DISEASES.						
Small-pox	—	—	—	—	—	—
Other Eruptive Fevers	33	—	—	—	—	1·76
Influenza	36	—	—	—	—	·75
Diphtheria	—	—	—	—	—	—
Enteric Fever	3	—	—	—	—	·54
Other Continued Fevers	8	—	—	—	—	·23
Cholera	—	—	—	—	—	—
Dysentery	—	—	—	—	—	—
Yellow Fever	—	—	—	—	—	—
Malarial Fevers	7	—	—	—	—	·27
Septic Diseases	3	—	—	—	—	·09
Tubercular Diseases	10	1	—	1	3	1·34
Syphilis, Primary	86	—	—	—	—	6·95
„ Secondary	59	—	—	—	1	4·38
Gonorrhœa	214	—	—	—	1	12·18
Hydrophobia	—	—	—	—	—	—
Parasitic Diseases	78	—	—	—	—	1·61
Scurvy	—	—	—	—	—	—
Alcoholism	7	—	—	—	—	·19
Rheumatism	56	—	—	—	—	3·46
Debility	21	—	—	—	1	·77
Other General Diseases	21	—	—	—	1	1·25
LOCAL DISEASES.						
Diseases of the—						
Nervous System { Nervous	28			—	3	2·52
Nervous System { Mental	8			—	6	1·42
Eye	27			—	4	2·07
Other Organs of Special Sense	24			—	4	1·59
Circulatory System	25	2		2	4	2·40
Respiratory „	133	4		4	4	6·68
Digestive „	240				6	7·86
Lymphatic „	24				—	1·75
Urinary „	1				—	·28
Generative „	79				—	4·08
Organs of Locomotion	48	—			5	2·70
Connective Tissue	94	—			—	3·59
Skin	209	—			—	8·22
INJURIES.						
General	—	1	—	1	—	—
Local	323	3	—	3	3	11·84
In Action	—	—	—	—	—	—
POISONS	—	—	—	—	—	—
No appreciable disease	11	—	—	—	—	·31
Cause unknown (refers to deaths only)	—	—	—	—	—	—
General Total	1,916	11	—	11	46	93·08

into Hospital, Deaths, Numbers Invalided and Constantly Sick the Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.				Average Ratio per 1,000 from 1887 to 1896.			
Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly Sick.	Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly Sick.
—	—	—	—	·1	—	—	·01
8·7	—	—	·47	6·2	—	—	·41
9·5	—	—	·20	7·8	·05	—	·18
—	—	—	—	—	·03	—	—
·8	—	—	·14	·6	·16	—	·09
2·1	—	—	·06	5·7	—	—	·14
—	—	—	—	—	—	—	—
—	—	—	—	·3	—	·03	·03
—	—	—	—	—	—	—	—
1·9	—	—	·07	2·8	—	·03	·07
·8	—	—	·02	2·2	·11	—	·11
2·6	·26	·79	·35	3·5	·25	1·48	·40
22·7	—	—	1·84	28·1	—	—	2·31
15·6	—	·26	1·16	30·1	·03	1·12	2·16
56·6	—	·26	3·22	71·0	—	·08	3·80
—	—	—	—	—	—	—	—
20·6	—	—	·43	23·7	—	—	·55
—	—	—	—	·2	·03	·03	·01
1·9	—	—	·05	2·8	—	—	·06
14·8	—	—	·92	25·4	·05	1·20	1·43
5·6	—	·26	·20	5·4	—	1·29	·30
5·6	—	·26	·33	3·9	·14	·22	·17
7·4	—	·79	·67	6·5	·35	1·04	·35
2·1	—	1·59	·38	1·8	—	·82	·24
7·1	—	1·06	·55	9·6	—	·96	·49
6·3	—	1·06	·42	5·4	·03	·79	·26
6·6	·53	1·06	·63	8·9	·49	3·66	·66
35·2	1·06	1·06	1·77	53·4	1·39	1·83	2·37
63·5	—	1·59	2·08	93·0	·30	1·42	2·28
6·3	—	—	·46	8·5	·03	·11	·57
·3	—	—	·07	2·5	·16	·41	·17
20·9	—	—	1·08	35·4	·03	·41	1·91
12·7	—	1·32	·71	9·2	·03	1·20	·47
24·8	—	—	·95	27·2	·03	·11	·93
55·3	—	—	2·17	51·5	—	·16	1·85
—	·26	—	—	·4	·55	·08	·04
85·4	·79	·79	3·13	97·9	·38	1·01	3·37
—	—	—	—	—	—	—	—
—	—	—	—	·1	·11	·03	·01
2·9	—	—	·08	2·1	—	—	·04
—	—	—	—	—	·03	—	—
806·6	2·91	12·16	24·61	633·2	5·36	19·52	29·24

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* These ratios are calculated on the strength including men detached.

ABSTRACT No. VI.—Table showing the Average Strength, Admis
the European Troops stationed in the West Indies during the Year

Average Strength, 1350.		Deaths.			Invalids.	
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.
GENERAL DISEASES.						
Small-pox	—	—	—	—	—	—
Other Eruptive Fevers	35	—	—	—	—	—
Influenza	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—
Enteric Fever	5	1	1	2	—	—
Other Continued Fevers	165	—	—	—	—	—
Cholera	—	—	—	—	—	—
Dysentery	20	1	—	1	—	—
Yellow Fever	16	10	—	10	—	—
Malarial Fevers	167	2	—	2	2	2
Septic Diseases	—	—	—	—	—	—
Tubercular Diseases	1	—	—	—	5	5
Syphilis, Primary	153	—	—	—	—	—
„ Secondary	129	—	—	—	10	5
Gonorrhœa	195	—	—	—	—	—
Hydrophobia	—	—	—	—	—	—
Parasitic Diseases	19	—	—	—	—	—
Scurvy	—	—	—	—	—	—
Alcoholism	21	1	—	1	—	—
Rheumatism	60	—	—	—	—	—
Debility	23	—	—	—	1	—
Other General Diseases	11	—	—	—	2	2
LOCAL DISEASES.						
Diseases of the—						
Nervous System { Nervous	13	—	—	—	4	3
Nervous System { Mental	—	—	—	—	—	—
Eye	21	—	—	—	—	—
Other Organs of Special Sense	27	—	—	—	2	2
Circulatory System	17	1	—	1	7	4
Respiratory „	24	—	—	—	1	1
Digestive „	147	1	—	1	1	—
Lymphatic „	62	—	—	—	2	1
Urinary „	3	1	—	1	1	—
Generative „	115	—	—	—	—	—
Organs of Locomotion	19	—	—	—	1	1
Connective Tissue	43	—	—	—	—	—
Skin	84	—	—	—	—	—
INJURIES.						
General	—	—	—	—	—	—
Local	157	1	—	1	3	2
In Action	—	—	—	—	—	—
POISONS.	1	—	—	—	—	—
No appreciable disease	8	—	—	—	—	—
Cause unknown (refers to deaths only)	—	—	—	—	—	—
General Total	1761	19	1	20	42	28

into HOSPITAL, DEATHS, NUMBER INVALIDED and CONSTANTLY SICK the Ratios per 1,000 of the Strength, and the Average ratios for 10 Years.

Ratio per 1,000.				Average Ratio per 1,000 from 1887 to 1896.			
Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly. Sick.	Admissions.	Deaths.*	Invalids finally Discharged.*	Constantly Sick.
—	—	—	—	—	—	—	—
6·7	·04	—	·46	4·7	·05	—	·32
4·0	—	—	·17	13·2	·04	—	·36
·1	·04	—	·01	·3	·02	—	·03
2·0	·35	—	·31	2·3	·47	—	·39
4·1	—	—	·17	[illegible]	·01	—	·20
—	—	—	—	—	—	—	—
·3	—	·04	·02	·3	·01	·03	·02
—	—	—	—	—	—	—	—
3·0	—	—	·12	2·9	·01	·01	·10
·4	·04	—	·04	1·5	·03	—	·10
2·3	·48	1·58	·41	3·6	·82	1·78	·59
37·1	—	—	3·42	48·9	—	—	4·57
27·0	·04	1·05	2·44	28·1	·06	·59	2·62
60·6	—	·13	4·68	78·8	—	·04	5·42
—	—	—	—	—	—	—	—
23·8	—	—	·81	23·4	—	—	·67
—	—	—	—	·1	—	—	·01
1·4	·04	—	·05	2·0	·02	·02	·06
24·4	·09	1·[illegible]	1·49	30·0	·03	·51	1·89
6·1	—	1·05	·38	7·2	·01	·84	·50
5·2	·09	·66	·35	4·8	·10	·13	·31
7·3	·18	1.36	·40	6·5	·27	1·00	·43
1·4	·04	·92	·23	1·6	·01	1·15	·29
18·0	—	·53	·62	11·9	—	·64	·75
9·7	—	2·06	·70	6·9	·01	·71	·44
12·6	·31	4·51	1·09	9·7	·32	3·00	·90
39·3	·48	·79	2·16	57·3	1·01	·67	2·94
86·4	·35	2·01	3·10	93·6	·29	·84	2·90
9·5	—	·22	·96	14·0	—	·11	1·48
2·2	·13	·53	·22	2·2	·14	·29	·20
22·4	—	·44	1·47	31·8	·01	·23	1·92
13·6	—	2·98	·96	9·2	·02	·90	·67
27·6	—	·13	1·22	23·5	—	·06	1·04
60·4	—	·18	2·71	47·2	—	·21	2·09
·2	·13	—	·01	·1	·41	—	·01
128·2	·26	1·40	5·24	103·1	·31	·59	4·17
—	—	—	—	—	—	—	—
·1	—	·04	·01	·1	·02	·01	·01
2·1	—	—	·09	2·2	—	—	·08
—	—	—	—	—	—	—	—
644·5	3·11	23·95	36·52	678·7	4·50	14·36	38·48

* These ratios are calculated on the strength including men detached.

ABSTRACT D. TABLE showing the AVERAGE STRENGTH, SICKNESS UNITED KINGDOM during the year 1897,

Average Strength.	Officers, 4,001.			
Diseases.	Attacks of Illness.	Deaths.	Ratio per 1,000.	
			Attacks.	Deaths.
GENERAL DISEASES.				
Small-pox	—	—	—	—
Other Eruptive Fevers	21	—	5·2	—
Influenza	138	1	34·5	·25
Diphtheria	—	—	—	—
Enteric Fever	3	1	·8	·25
Other Continued Fevers	35	—	8·7	—
Cholera	—	—	—	—
Dysentery	6	—	1·5	—
Malarial Fevers	53	—	13·2	—
Septic Diseases	2	1	·5	·25
Tubercular Diseases	—	—	—	—
Syphilis, Primary	2	—	·5	—
„ Secondary	1	—	·3	—
Gonorrhœa	9	—	2·3	—
Hydrophobia	—	—	—	—
Parasitic Diseases	—	—	—	—
Scurvy	—	—	—	—
Alcoholism	—	—	—	—
Rheumatism	54	—	13·5	—
Debility	10	—	2·5	—
Other General Diseases	15	3	3·8	·75
LOCAL DISEASES.				
Diseases of the—				
Nervous System { Nervous	18	1	4·5	·25
Mental	2	—	·5	—
Eye	12	—	3·0	—
Other Organs of Special Sense	5	—	1·3	—
Circulatory System	10	3	2·5	·75
Respiratory „	140	1	35·0	·25
Digestive „	203	2	50·7	·50
Lymphatic „	12	—	3·0	—
Urinary „	19	—	4·7	—
Generative „	19	—	4·7	—
Organs of Locomotion	65	—	16·2	—
Connective Tissue	33	—	8·2	—
Skin	40	—	10·0	—
INJURIES.				
General	3	—	·8	—
Local	263	3	65·7	·75
In Action	—	—	—	—
POISONS	1	1	·3	·25
No appreciable disease	—	—	—	—
General Total	1,194	17	298·4	4·25

OSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK, among
Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
		valids nt ne.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
—	—	—	—	—	—	—	—	—	·01
·6	—	—	—	·01	13·7	—	—	—	·69
2·4	—	—	—	·07	6·3	—	—	—	·23
—	—	—	—	—	—	—	—	—	—
5·5	2·46	—	—	·49	3·0	1·37	—	—	·28
51·0	—	—	—	1·44	85·6	·30	—	—	2·85
—	—	—	—	—	—	—	—	—	—
47·3	2·46	—	—	2·92	13·0	·15	—	·15	·77
3·7	1·23	—	—	·17	·1	—	—	—	—
163·3	3·68	—	—	9·01	98·8	1·29	—	·53	3·51
—	—	—	—	—	·3	—	—	—	·01
9·8	1·84	—	6·14	1·04	13·1	3·11	—	8·12	2·00
109·9	—	—	—	10·50	102·5	—	—	—	9·54
38·7	—	—	5·52	5·25	49·4	·15	—	6·91	5·09
107·4	—	—	—	9·87	163·8	—	—	·08	10·94
—	—	—	—	—	—	—	—	—	—
32·5	—	—	—	1·20	32·5	—	—	—	1·00
—	—	—	—	—	·1	—	—	—	·01
·6	—	—	—	·03	·1	—	—	—	—
20·9	—	—	1·23	1·75	55·5	—	—	2·28	3·44
5·5	—	—	1·84	·61	6·5	—	—	2·51	·56
6·1	—	—	1·84	·63	9·1	·23	—	1·37	·44
12·3	—	—	3·68	1·12	9·3	·08	—	2·58	·64
—	—	—	—	·02	1·2	—	—	1·29	·31
17·8	—	—	·61	1·42	26·6	—	—	2·20	1·32
8·6	—	—	—	·48	6·7	—	—	·68	·46
12·9	·61	—	6·14	1·58	14·1	1·06	—	4·33	1·41
35·0	1·23	—	2·46	3·09	49·3	2·28	—	1·44	3·39
85·3	—	—	1·23	2·70	64·5	·68	—	1·75	2·16
27·0	—	—	1·23	3·07	43·8	·08	—	1·06	4·03
1·8	—	—	·61	·17	2·7	·30	—	·84	·26
51·0	—	—	3·07	4·36	119·0	—	—	1·67	9·15
11·7	—	—	1·23	1·27	8·4	·08	—	2·05	·68
29·5	—	—	—	1·76	30·2	—	—	·16	1·87
25·2	—	—	—	1·31	46·7	—	—	·76	2·89
·6	1·23	—	—	·02	·4	·61	—	—	—
70·0	—	—	1·84	3·63	77·9	·15	—	1·21	3·48
—	—	—	—	—	—	—	—	—	—
·6	—	—	—	·01	·2	—	—	—	—
4·3	—	—	—	·04	6·5	—	—	—	·15
—	—	—	—	—	—	—	—	—	—
998·8	14·73	—	38·67	71·04	1,160·9	11·92	—	43·96	74·17

ABSTRACT No. VII.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS
the NON-EUROPEAN TROOPS stationed in the WEST INDIES during the year 1897,

Average Strength, 1,629.	Admissions into Hospital.	Deaths.			Invalids.		Average Number constantly Sick.
Diseases.		In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.	
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	1	—	—	—	—	—	·01
Influenza	4	—	—	—	—	—	·11
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	9	4	—	4	—	—	·79
Other Continued Fevers	83	—	—	—	—	—	2·35
Cholera	—	—	—	—	—	—	—
Dysentery	77	4	—	4	—	—	4·76
Yellow Fever	6	2	—	2	—	—	·28
Malarial Fevers	266	6	—	6	—	—	14·68
Septic Diseases	—	—	—	—	—	—	—
Tubercular Diseases	16	3	—	3	—	10	1·70
Syphilis, Primary	179	—	—	—	—	—	17·11
" Secondary	63	—	—	—	—	9	8·56
Gonorrhœa	175	—	—	—	—	—	16·08
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	53	—	—	—	—	—	1·94
Scurvy	—	—	—	—	—	—	—
Alcoholism	1	—	—	—	—	—	·05
Rheumatism	34	—	—	—	—	2	2·85
Debility	9	—	—	—	—	3	1·00
Other General Diseases	10	—	—	—	—	3	1·03
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	20	—	—	—	—	6	1·83
Nervous System { Mental	—	—	—	—	—	—	·04
Eye	29	—	—	—	—	1	2·31
Other Organs of Special Sense	14	—	—	—	—	—	·78
Circulatory System	21	1	—	1	—	10	2·57
Respiratory "	57	2	—	2	—	4	5·03
Digestive "	139	—	—	—	—	2	4·39
Lymphatic "	44	—	—	—	—	2	4·99
Urinary "	3	—	—	—	—	1	·28
Generative "	83	—	—	—	—	5	7·10
Organs of Locomotion	19	—	—	—	—	2	2·07
Connective Tissue	48	—	—	—	—	—	2·87
Skin	41	—	—	—	—	—	2·14
INJURIES.							
General	1	2	—	2	—	—	·04
Local	114	—	—	—	—	3	5·91
In Action	—	—	—	—	—	—	—
POISONS	1	—	—	—	—	—	·01
No appreciable disease	7	—	—	—	—	—	·07
Cause unknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	1,627	24	—	24	—	63	115·72

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK, among with the Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
—	—	—	—	—	—	—	—	—	·01
·6	—	—	—	·01	13·7	—	—	—	·69
2·4	—	—	—	·07	6·3	—	—	—	·23
—	—	—	—	—	—	—	—	—	—
5·5	2·46	—	—	·49	3·0	1·37	—	—	·28
51·0	—	—	—	1·44	85·6	·30	—	—	2·85
—	—	—	—	—	—	—	—	—	—
47·3	2·46	—	—	2·92	13·0	·15	—	·15	·77
3·7	1·23	—	—	·17	·1	—	—	—	—
163·3	3·68	—	—	9·01	98·8	1·29	—	·53	3·51
—	—	—	—	—	·3	—	—	—	·01
9·8	1·84	—	6·14	1·04	13·1	3·11	—	8·12	2·00
109·9	—	—	—	10·50	102·5	—	—	—	9·54
38·7	—	—	5·52	5·25	49·4	·15	—	6·91	5·09
107·4	—	—	—	9·87	163·8	—	—	·08	10·94
—	—	—	—	—	—	—	—	—	—
32·5	—	—	—	1·20	32·5	—	—	—	1·00
—	—	—	—	—	·1	—	—	—	·01
·6	—	—	—	·03	·1	—	—	—	—
20·9	—	—	1·23	1·75	55·5	—	—	2·28	3·44
5·5	—	—	1·84	·61	6·5	—	—	2·51	·56
6·1	—	—	1·84	·63	9·1	·23	—	1·37	·44
12·3	—	—	3·68	1·12	9·3	·08	—	2·58	·64
—	—	—	—	·02	1·2	—	—	1·29	·31
17·8	—	—	·61	1·42	26·6	—	—	2·20	1·32
8·6	—	—	—	·48	6·7	—	—	·68	·46
12·9	·61	—	6·14	1·58	14·1	1·06	—	4·33	1·41
35·0	1·23	—	2·46	3·09	49·3	2·28	—	1·44	3·39
85·3	—	—	1·23	2·70	64·5	·68	—	1·75	2·16
27·0	—	—	1·23	3·07	43·8	·08	—	1·06	4·03
1·8	—	—	·61	·17	2·7	·30	—	·84	·26
51·0	—	—	3·07	4·36	119·0	—	—	1·67	9·15
11·7	—	—	1·23	1·27	8·4	·08	—	2·05	·68
29·5	—	—	—	1·76	30·2	—	—	·16	1·87
25·2	—	—	—	1·31	46·7	—	—	·76	2·89
·6	1·23	—	—	·02	·4	·61	—	—	—
70·0	—	—	1·84	3·63	77·9	·15	—	1·21	3·48
—	—	—	—	—	—	—	—	—	—
·6	—	—	—	·01	·2	—	—	—	—
4·3	—	—	—	·04	6·5	—	—	—	·15
—	—	—	—	—	—	—	—	—	—
998·8	14·73	—	38·67	71·04	1,160·9	11·92	—	43·96	74·17

ABSTRACT No. VIII.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS
the EUROPEAN TROOPS stationed in WESTERN AFRICA during the Year 1897

Average Strength, 38.		Deaths.			Invalids.		
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.	Average Number constantly Sick.
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	—	—	—	—	—	—	—
Influenza	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	—	—	—	—	—	—	—
Other Continued Fevers	—	—	—	—	—	—	—
Cholera	—	—	—	—	—	—	—
Dysentery	—	—	—	—	—	—	—
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	69	2	—	2	10	—	1·91
Septic Diseases	—	—	—	—	—	—	—
Tubercular Diseases	—	—	—	—	—	—	—
Syphilis, Primary	1	—	—	—	—	—	·01
„ Secondary	4	—	—	—	1	—	·31
Gonorrhœa	3	—	—	—	—	—	·09
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	1	—	—	—	—	—	·04
Scurvy	—	—	—	—	—	—	—
Alcoholism	—	—	—	—	—	—	—
Rheumatism	2	—	—	—	—	—	·05
Debility	—	—	—	—	—	—	—
Other General Diseases	—	—	—	—	—	—	—
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	1	—	—	—	—	—	·02
Nervous System { Mental	—	—	—	—	—	—	—
Eye	1	—	—	—	—	—	·04
Other Ogans of Special Sense	—	—	—	—	—	—	—
Circulatory System...	1	—	—	—	—	—	·01
Respiratory „	1	—	—	—	—	—	·02
Digestive „	4	—	—	—	—	—	·07
Lymphatic „	—	—	—	—	—	—	—
Urinary „	—	—	—	—	—	—	—
Generative „	6	—	—	—	2	—	·43
Organs of Locomotion	1	—	—	—	—	—	·02
Connective Tissue	1	—	—	—	—	—	·02
Skin	1	—	—	—	—	—	·12
INJURIES.							
General	—	—	—	—	—	—	—
Local	1	—	—	—	—	—	·05
In Action	—	—	—	—	—	—	—
POISONS	—	—	—	—	—	—	—
No appreciable disease	—	—	—	—	—	—	—
Cause unknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	98	2	—	2	13	—	3·21

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK, among
with the Ratios per 1,000 of the Strength, and the Average Ratios for 8 years.

Ratio per 1,000.					Average Ratio per 1,000 from 1889 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
1815·8	52·63	263·16	—	50·26	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
26·3	—	—	—	·23	—	—	—	—	—
105·3	—	26·32	—	8·16	—	—	—	—	—
79·0	—	—	—	2·37	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
26·3	—	—	—	1·05	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
52·6	—	—	—	1·31	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
26·3	—	—	—	·53	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
26·3	—	—	—	1·05	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
26·3	—	—	—	·26	—	—	—	—	—
26·3	—	—	—	·53	—	—	—	—	—
105·3	—	—	—	1·84	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
157·9	—	52·63	—	11·32	—	—	—	—	—
26·3	—	—	—	·53	—	—	—	—	—
26·3	—	—	—	·53	—	—	—	—	—
26·3	—	—	—	3·16	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
26·3	—	—	—	1·31	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
2578·9	52·63	342·11	—	84·47	2652·7	45·02	237·94	12·86	84·89

ABSTRACT No. IX.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS the NON-EUROPEAN TROOPS stationed in WESTERN AFRICA during the Year 1897,

Average Strength, 822		Deaths.			Invalids.		
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent to West Indies.	Number finally Discharged the Service.	Average Number constantly Sick.
GENERAL DISEASES.							
Small-pox ...	—	—	—	—	—	—	—
Other Eruptive Fevers ...	7	—	—	—	—	—	·11
Influenza ...	—	—	—	—	—	—	—
Diphtheria ...	—	—	—	—	—	—	—
Enteric Fever ...	—	—	—	—	—	—	—
Other Continued Fevers ...	—	—	—	—	—	—	—
Cholera ...	—	—	—	—	—	—	—
Dysentery ...	9	1	—	1	—	—	·19
Yellow Fever ...	—	—	—	—	—	—	—
Malarial Fevers ...	575	—	—	—	12	1	16·79
Septic Diseases ...	1	—	—	—	—	—	·04
Tubercular Diseases ...	9	7	1	8	12	5	3·12
Syphilis, Primary ...	22	—	—	—	—	—	2·59
„ Secondary ...	55	—	—	—	21	6	8·45
Gonorrhœa ...	77	—	—	—	1	—	5·23
Hydrophobia ...	—	—	—	—	—	—	—
Parasitic Diseases ...	19	—	—	—	—	—	·59
Scurvy ...	—	—	—	—	—	—	—
Alcoholism ...	—	—	—	—	—	—	—
Rheumatism ...	62	—	—	—	8	1	3·78
Debility ...	2	—	—	—	5	—	·05
Other General Diseases ...	4	—	—	—	—	—	·22
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous ...	1	—	—	—	2	1	·02
Nervous System { Mental ...	1	—	—	—	1	1	·42
Eye ...	18	—	—	—	—	—	·93
Other Organs of Special Sense ...	3	—	—	—	1	—	·15
Circulatory System ...	8	1	1	2	11	5	·33
Respiratory „ ...	38	3	1	4	4	—	1·64
Digestive „ ...	34	—	—	—	1	—	1·03
Lymphatic „ ...	22	—	—	—	1	—	2·95
Urinary „ ...	1	1	—	1	2	2	·04
Generative „ ...	65	—	—	—	1	2	3·98
Organs of Locomotion ...	12	—	—	—	5	4	·72
Connective Tissue ...	26	—	—	—	—	—	·91
Skin ...	44	—	—	—	3	1	3·07
INJURIES.							
General ...	—	—	—	—	—	—	—
Local ...	58	—	—	—	—	—	3·35
In Action ...	—	—	—	—	—	—	—
POISONS ...	—	—	—	—	—	—	—
No appreciable disease ...	—	—	—	—	—	—	—
Cause unknown (refers to deaths only) ...	—	—	—	—	—	—	—
General Total ...	1,173	13	3	16	91	29	60·70

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK, among with the Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent to West Indies.	Invalids finally discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent to West Indies.	Invalids finally discharged.	Constantly Sick.
—	—	—	—	—	·4	—	—	—	·01
8·5	—	—	—	·13	2·6	—	—	—	·07
—	—	—	—	—	6·6	·13	—	—	·28
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	·4	·27	—	—	·05
—	—	—	—	—	·9	—	—	—	·06
—	—	—	—	—	—	—	—	—	—
11·0	1·22	—	—	·23	14·4	·66	·40	—	·82
—	—	—	—	—	—	—	—	—	—
699·5	—	14·60	1·22	20·43	972·1	6·47	3·17	·13	26·92
1·2	—	—	—	·05	·9	·13	—	—	·01
11·0	9·73	14·60	6·08	3·80	13·2	4·63	5·41	2·77	2·19
26·8	—	—	—	3·15	45·3	—	·13	—	4·28
66·9	—	25·55	7·30	10·28	51·5	—	5·68	3·30	5·27
93·7	—	1·22	—	6·36	123·3	—	—	—	7·50
—	—	—	—	—	—	—	—	—	—
23·1	—	—	—	·72	48·9	—	—	—	1·54
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	·7	—	—	—	·03
75·4	—	9·73	1·22	4·60	82·0	·13	3·83	1·32	5·80
2·4	—	6·08	—	·06	16·9	—	6·47	·27	1·29
4·9	—	—	—	·27	2·5	·26	—	·13	·14
1·2	—	2·43	1·22	·02	10·7	·53	1·06	·53	·92
1·2	—	1·22	1·22	·51	1·7	—	·40	·40	·14
21·9	—	—	—	1·13	19·6	—	·93	·53	1·32
3·6	—	1·22	—	·18	6·2	—	·53	·53	·52
9·7	2·43	13·38	6·08	·40	14·5	1·32	2·64	1·45	1·25
46·2	4·87	4·87	—	2·00	52·8	1·98	·79	·66	2·87
41·4	—	1·22	—	1·25	66·5	·79	·53	·40	2·33
26·8	—	1·22	—	3·59	41·9	—	1·06	·27	3·85
1·2	1·22	2·43	2·43	·05	5·7	1·45	·79	·53	·56
79·1	—	1·22	2·43	4·84	84·4	—	·66	·66	6·32
14·6	—	6·08	4·87	·88	11·8	·13	1·59	·79	1·11
31·6	—	—	—	1·11	38·2	·13	·26	—	2·09
53·5	—	3·65	1·22	3·73	90·2	—	·53	·27	4·87
—	—	—	—	—	·1	·53	—	—	—
70·6	—	—	—	4·07	65·8	·40	·13	·79	3·07
—	—	—	—	—	3·2	·27	·40	—	·24
—	—	—	—	—	·1	—	—	—	—
—	—	—	—	—	1·1	—	—	—	·06
—	—	—	—	—	—	—	—	—	—
1,427·0	19·46	110·71	35·28	73·84	1,897·1	20·21	37·30	15·72	87·78

ABSTRACT No. X.—TABLE showing the AVERAGE STRENGTH, ADMISSION
the TROOPS stationed at SOUTH AFRICA and ST. HELENA during the Year 1897,

Average Strength, 7,205.		Deaths.			Invalids.		
Diseases.	Admissions into Hospital.	In the command.	Of Invalids.	Total.	Number sent Home.	Number finally discharged the service.	Average Number constantly sick.
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	6	—	—	—	—	—	·77
Influenza	13	—	—	—	—	—	·54
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	160	13	—	13	1	—	21·99
Other Continued Fevers	334	—	—	—	1	—	21·40
Cholera	—	—	—	—	—	—	—
Dysentery	209	4	—	4	1	—	11·75
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	392	1	—	1	2	—	19·11
Septic Diseases	9	4	—	4	—	—	·64
Tubercular Diseases	15	4	2	6	7	5	4·29
Syphilis, Primary	428	—	—	—	—	—	41·45
,, Secondary	289	1	—	1	7	7	36·39
Gonorrhœa	679	—	—	—	—	—	57·37
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	97	—	—	—	—	—	3·56
Scurvy	—	—	—	—	—	—	—
Alcoholism	3	—	—	—	—	—	·22
Rheumatism	255	1	—	1	3	3	16·11
Debility	30	—	—	—	3	—	1·98
Other General Diseases	72	—	—	—	—	—	4·62
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	35	1	—	1	12	12	2·86
Nervous System { Mental	4	—	—	—	2	3	1·61
Eye	80	—	—	—	1	1	4·89
Other Organs of Special Sense	73	—	—	—	5	5	5·16
Circulatory System	45	1	—	1	10	11	5·19
Respiratory ,, ...	168	1	—	1	3	2	11·71
Digestive ,, ...	774	4	—	4	2	—	27·16
Lymphatic ,, ...	132	—	—	—	1	1	13·28
Urinary ,, ...	11	1	—	1	—	—	·85
Generative ,, ...	219	—	—	—	—	—	15·10
Organs of Locomotion	105	—	—	—	5	6	7·06
Connective Tissue	229	—	—	—	—	—	10·26
Skin	319	—	—	—	—	1	14·48
INJURIES.							
General	11	2	—	2	1	—	·95
Local	1078	6	—	6	1	1	47·37
In Action	5	2	—	2	7	8	1·31
POISONS	3	2	—	2	—	—	·01
No appreciable disease	16	—	—	—	—	—	·53
Cause unknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	6298	48	2	50	75	66	411·97

INTO HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK, among Ratios per 1,000 of the Strength, and the Average Ratios for 10 Years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
—	—	—	—	—	—	—	—	—	—
5·6	—	—	—	·24	1·9	·07	—	—	·12
18·7	—	—	—	·44	7·1	—	—	—	·23
—	—	—	—	—	·1	—	—	—	·01
·6	—	—	—	·16	1·4	·22	·07	—	·25
1·3	—	—	—	·09	1·7	—	—	—	·07
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	·1	—	—	—	·01
—	—	—	—	—	·1	—	—	—	·01
—	—	—	—	—	1·4	—	—	—	·05
·6	—	—	—	·02	2·1	·07	—	—	·14
3·7	—	1·87	·62	·31	2·5	·93	1·58	1·44	·28
31·2	—	—	—	2·73	27·6	—	—	—	1·92
30·6	—	2·50	—	2·77	17·8	—	·57	·43	1·52
61·8	—	—	—	2·24	59·9	—	—	—	2·83
—	—	—	—	—	—	—	—	—	—
28·1	—	—	—	·65	8·7	—	—	—	·22
—	—	—	—	—	—	—	—	—	—
3·7	—	—	—	·07	3·2	—	—	—	·09
20·0	—	—	·62	·81	30·0	—	·79	·14	1·89
1 3	—	—	—	·05	2·6	—	·79	·57	·17
5·6	—	·62	--	·22	6·8	—	·36	·22	·30
6·9	—	1·87	1·87	·26	9·2	·50	1·94	1·79	·64
1·9	—	1·87	1·87	·40	·8	·07	·72	·65	·15
4·4	—	·62	—	·26	8·5	—	·79	·72	·36
6·9	—	—	—	·16	6·2	·07	·57	·57	·42
3·1	·62	1·25	·62	·26	8·6	·50	2·01	2·15	·80
25·0	—	—	·62	1·02	35·7	·64	1·00	·86	1·87
60·0	—	—	—	1·45	74·5	·22	·21	·14	1·86
11·3	—	—	—	·98	16·8	—	·07	—	1·69
2·5	—	·62	—	·25	2·4	·11	·65	·43	·25
18 7	—	—	—	·62	26·9	—	·21	·14	1·23
5·6	—	·62	1·25	·50	9·5	—	1·22	·93	·82
22·3	—	—	—	·64	21·3	—	·14	—	·88
48·1	—	1·87	1·25	2·44	25·9	—	—	·07	1·07
·6	—	—	—	·02	·3	·43	—	—	·02
105·6	—	·62	·62	3·53	75·7	·29	·65	·65	2·29
—	—	—	—	—	—	—	—	--	—
—	—	—	—	—	·3	·22	—	—	—
3·1	—	—	—	·18	1·5	—	—	—	·08
—	—	—	—	—	—	—	—	—	—
539·0	·62	14·36	9·37	23·77	499·1	4·37	14·34	11·90	25·54

ABSTRACT No. XI.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS the Troops stationed at MAURITIUS during the Year 1897, with the

Average Strength, 756.	Admissions into Hospital.	Deaths.			Invalids.		Average Number constantly Sick.
Diseases.		In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.	
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	1	—	—	—	—	—	·01
Influenza	3	—	—	—	—	—	·16
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	8	3	1	4	—	—	1·61
Other Continued Fevers	—	—	—	—	—	—	—
Cholera	—	—	—	—	—	—	—
Dysentery	4	—	—	—	—	—	·68
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	307	1	—	1	21	—	14·24
Septic Diseases	—	—	—	—	—	—	—
Tubercular Diseases	1	—	—	—	1	1	·16
Syphilis, Primary	26	—	—	—	1	1	4·20
" Secondary	18	—	—	—	2	—	2·78
Gonorrhœa	120	—	—	—	1	—	9·03
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	3	—	—	—	—	—	·17
Scurvy	—	—	—	—	—	—	—
Alcoholism	—	—	—	—	—	—	—
Rheumatism	11	—	—	—	2	—	1·38
Debility	4	—	—	—	1	—	·33
Other General Diseases	17	—	—	—	—	—	1·36
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	7	1	—	1	—	—	·19
Nervous System { Mental	—	—	—	—	—	—	—
Eye	1	—	—	—	—	—	·02
Other Organs of Special Sense	11	—	—	—	—	—	·34
Circulatory System	7	1	—	1	3	1	·26
Respiratory "	37	—	—	—	—	—	1·55
Digestive "	83	—	—	—	1	—	4·00
Lymphatic "	24	—	—	—	3	—	6·00
Urinary "	—	—	—	—	—	—	—
Generative "	49	—	—	—	1	—	4·61
Organs of Locomotion	2	—	—	—	—	1	·22
Connective Tissue	12	—	—	—	—	—	·54
Skin	33	—	—	—	—	—	2·02
INJURIES.							
General	—	—	—	—	—	—	—
Local	88	—	—	—	1	—	4·49
In Action	—	—	—	—	—	—	—
POISONS	1	—	—	—	—	—	·02
No appreciable disease	3	—	—	—	—	—	·21
Cause unknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	881	6	1	7	38	4	60·60

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK a
Ratios per 1,000 of the Strength, and the Average Ratios for 10 Years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 18				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Co star Sic.
—	—	—	—	—	·2	—	—	—	·02
1·3	—	—	—	·01	·9	—	—	—	·07
4·0	—	—	—	·24	2·4	—	—	—	·07
—	—	—	—	—	—	—	—	—	—
10·6	5·29	—	—	2·13	14·7	4·95	·18	—	2·00
—	—	—	—	—	1·6	·74	—	—	·12
—	—	—	—	—	—	—	—	—	—
5·3	—	—	—	·90	16·7	·55	1·10	—	1·25
—	—	—	—	—	—	—	—	—	—
406·1	1·32	27·78	—	18·84	608·2	3·12	29·90	1·28	26·52
—	—	—	—	—	1·1	·18	—	—	·05
1·3	—	1·32	1·32	·21	2·6	·74	1·47	1·65	·38
34·4	—	1·32	1·32	5·56	42·4	—	—	—	3·40
23·8	—	2·65	—	3·68	33·9	—	2·75	1 29	3·13
158·7	—	1·32	—	11·94	106·0	—	—	—	7·25
—	—	—	—	—	—	—	—	—	—
4·0	—	—	—	·22	18·5	—	—	·18	·46
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	2·2	·18	—	—	·07
14·5	—	2·65	—	1·82	20·0	—	1·28	·73	1·20
5·3	—	1·32	—	·44	12·1	·18	5·32	1·29	·77
22·5	—	—	—	1·80	6·8	—	·37	·18	·42
9·3	1·32	—	—	·25	8·8	·55	1·47	1·65	·56
—	—	—	—	—	2·0	·18	1·83	2·38	·30
1·3	—	—	—	·03	11·4	—	1·47	·73	·88
14·5	—	—	—	·45	15·8	—	1·47	·92	·88
9·3	1·32	3·97	1·32	·34	13·0	·55	2·75	3·12	·95
48·9	—	—	—	2·05	22·6	—	·55	·18	1·24
109·8	—	1·32	—	5·29	111·3	1·28	1·65	·37	4·05
31·7	—	3·97	—	7·94	43·5	—	—	·18	5·32
—	—	—	—	—	4·8	·18	1·47	·55	·46
64·8	—	1·32	—	6·10	56·7	—	·18	·37	3·83
2·6	—	—	1·32	·29	9·9	—	—	—	·63
15·9	—	—	—	·71	19·6	—	—	—	·80
43·7	—	—	—	2·67	41·8	—	—	—	2·01
—	—	—	—	—	1·1	·92	·18	—	·02
16·4	—	1·32	—	5·94	107·8	·74	·55	·37	4·52
—	—	—	—	—	—	—	—	—	—
1·3	—	—	—	·03	—	—	—	—	—
·0	—	—	—	·28	4 0	—	—	—	·13
—	—	—	—	—	—	—	—	—	—
·3	9·26	50·26	5·29	80·16	1,364·4	15·04	55·94	17·42	73·76

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ABSTRACT No. VI.—TABLE showing the AVERAGE STRENGTH, ADM
the EUROPEAN TROOPS stationed in the WEST INDIES during the Yea

Average Strength, 1350.	Admissions into Hospital.	Deaths.			Invalids.	
Diseases.		In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the
GENERAL DISEASES.						
Small-pox	—	—	—	—	—	—
Other Eruptive Fevers	35	—	—	—	—	—
Influenza	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—
Enteric Fever	5	1	1	2	—	—
Other Continued Fevers	165	—	—	—	—	—
Cholera	—	—	—	—	—	—
Dysentery	20	1	—	1	—	—
Yellow Fever	16	10	—	10	—	—
Malarial Fevers	167	2	—	2	2	2
Septic Diseases	—	—	—	—	—	—
Tubercular Diseases	1	—	—	—	5	5
Syphilis, Primary	153	—	—	—	—	—
„ Secondary	129	—	—	—	10	5
Gonorrhœa	195	—	—	—	—	—
Hydrophobia	—	—	—	—	—	—
Parasitic Diseases	19	—	—	—	—	—
Scurvy	—	—	—	—	—	—
Alcoholism	21	1	—	1	—	—
Rheumatism	60	—	—	—	—	—
Debility	23	—	—	—	1	—
Other General Diseases	11	—	—	—	2	2
LOCAL DISEASES.						
Diseases of the—						
Nervous System { Nervous	13	—	—	—	4	3
Nervous System { Mental	—	—	—	—	—	—
Eye	21	—	—	—	—	—
Other Organs of Special Sense	27	—	—	—	2	2
Circulatory System	17	1	—	1	7	4
Respiratory „	24	—	—	—	1	1
Digestive „	147	1	—	1	1	—
Lymphatic „	62	—	—	—	2	1
Urinary „	3	1	—	1	1	—
Generative „	115	—	—	—	—	—
Organs of Locomotion	19	—	—	—	1	1
Connective Tissue	43	—	—	—	—	—
Skin	84	—	—	—	—	—
INJURIES.						
General	—	—	—	—	—	—
Local	157	1	—	1	3	2
In Action	—	—	—	—	—	—
POISONS.	1	—	—	—	—	—
No appreciable disease	8	—	—	—	—	—
Cause unknown (refers to deaths only)	—	—	—	—	—	—
General Total	1761	19	1	20	42	28

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK among with the Ratios per 1,000 of the Strength, and the Average Ratios for 10 Years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
—	—	—	—	—	—	—	—	—	—
25·9	—	—	—	1·44	4·6	—	—	—	·14
—	—	—	—	—	20·2	—	—	—	·51
—	—	—	—	—	·1	·09	—	—	—
3·7	1·48	—	—	·63	9·9	2·61	·08	—	1·42
122·2	—	—	—	4·28	87·1	·09	·08	—	2·98
—	—	—	—	—	—	—	—	—	—
14·8	·74	—	—	1·07	5·6	·25	·34	—	·39
11·9	7·41	—	—	·73	1·8	·84	—	—	·08
123·7	1·48	1·48	1·48	6·15	52·4	·68	·76	·08	2·19
—	—	—	—	—	·3	—	—	—	·03
·7	—	3·70	3·70	·44	2·7	·34	1·51	1·27	·54
113·3	—	—	—	11·62	46·0	—	—	—	4·14
95·6	—	7·41	3·70	11·16	44·5	·17	2·02	·84	4·56
144·5	—	—	—	12·78	154·3	—	·17	—	11·09
—	—	—	—	—	—	—	—	—	—
14·1	—	—	—	·05	16·6	—	—	—	·48
—	—	—	—	—	—	—	—	—	—
15·6	·74	—	—	·32	7·8	·08	—	—	·19
44·4	—	—	—	1·82	39·5	·08	1·35	·67	2·38
17·0	—	·74	—	1·14	14·5	—	1·86	·93	·96
8·1	—	1·48	1·48	·45	9·4	·17	·42	·25	·64
9·6	—	2·96	2·22	·69	12·9	·25	1·94	1·52	·96
—	—	—	—	—	·7	—	·59	·67	·13
15·6	—	—	—	·91	12·0	—	1·10	1·18	·76
20·0	—	1·48	1·48	·79	22·4	—	1·35	·93	1·09
12·6	·74	5·19	2·96	1·40	9·6	·42	1·94	1·86	·86
17·8	—	·74	·74	1·79	26·6	·42	·51	·59	1·29
108·9	·74	·74	—	4·31	99·8	·42	1·43	1·01	3·13
45·9	—	1·48	·74	6·08	44·2	—	·59	·17	5·13
2·2	·74	·74	—	·20	1·9	·17	·08	·17	·15
85·2	—	—	—	6·16	118·4	—	·17	·17	8·35
14·1	—	·74	·74	·99	9·1	·08	·84	·59	·76
31·9	—	—	—	1·13	40·2	—	—	—	1·56
62·2	—	—	—	2·25	62·5	—	·34	·08	2·61
—	—	—	—	—	·3	·34	—	—	·05
116·3	·74	2·22	1·48	5·45	136·9	·63	·76	·42	4·81
—	—	—	—	—	—	—	—	—	—
·7	—	—	—	·01	·6	·17	—	—	·01
5·9	—	—	—	·13	3·9	—	—	—	·08
—	—	—	—	—	—	·08	—	—	—
1304·4	14·81	31·11	20·74	87·00	1,119·3	8·43	20·23	13·40	64·48

ABSTRACT No. XIII.—TABLE showing the AVERAGE STRENGTH, ADMISSION among the TROOPS stationed in CHINA during the Year 1897, with th

Average Strength, 1417.		Deaths.			Invalids.		
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.	Average Number co[illegible]
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	—	—	—	—	—	—	—
Influenza	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	1	1	—	1	—	—	·23
Other Continued Fevers	5	—	—	—	—	—	·43
Cholera	—	—	—	—	—	—	—
Dysentery	1	—	—	—	—	—	·02
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	840	1	—	1	20	4	27·72
Septic Diseases	—	—	—	—	—	—	—
Tubercular Diseases	4	1	1	2	4	—	·29
Syphilis, Primary	168	—	—	—	—	—	17·26
,, Secondary	121	—	—	—	3	4	10·33
Gonorrhœa	411	—	—	—	—	—	13·29
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	65	—	—	—	—	—	1·40
Scurvy	—	—	—	—	—	—	—
Alcoholism	9	1	—	1	1	—	·48
Rheumatism	38	—	—	—	2	—	2·52
Debility	26	—	—	—	4	—	1·22
Other General Diseases	34	—	—	—	1	—	1·61
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	31	1	—	1	4	1	[illegible]·92
Nervous System { Mental	4	1	—	1	2	1	·08
Eye	16	—	—	—	—	1	[illegible]·18
Other Organs of Special Sense	113	—	—	—	13	6	[illegible]·61
Circulatory System	25	—	—	—	9	5	[illegible]·89
Respiratory ,,	51	—	—	—	—	2	[illegible]·13
Digestive ,,	206	—	—	—	6	1	[illegible]·37
Lymphatic ,,	42	—	—	—	—	—	[illegible]·11
Urinary ,,	3	—	—	—	—	—	·09
Generative ,,	288	—	—	—	2	2	20·06
Organs of Locomotion	19	—	—	—	—	—	[illegible]·02
Connective Tissue	75	—	—	—	—	—	[illegible]·48
Skin	177	—	—	—	1	—	[illegible]·43
INJURIES.							
General	2	2	—	2	—	—	·0[illegible]
Local	197	2	—	2	1	2	[illegible]·9[illegible]
In Action	—	—	—	—	—	—	—
POISONS	—	—	—	—	—	—	—
No appreciable disease	1	—	—	—	—	—	·0[illegible]
Cause unknown (refers to death only)	—	—	—	—	—	—	—
General Total	2973	10	1	11	73	29	[illegible]

nto Hospital, Deaths, Numbers Invalided and Constantly Sick,
Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home	Invalids finally Discharged.	Constantly Sick.
—	—	—	—	—	1·1	—	—	—	·08
—	—	—	—	—	·1	—	—	—	·01
—	—	—	—	—	2·9	—	—	—	·10
—	—	—	—	—	·1	—	—	—	·01
·7	·71	—	—	·16	2·1	·58	·15	—	·28
3·5	—	—	—	·30	19·3	—	—	—	·67
—	—	—	—	—	·5	·44	—	—	—
·7	—	—	—	·01	13·0	·36	·87	—	·73
—	—	—	—	—	—	—	—	—	—
592·8	·71	14·11	2·82	19·56	479·8	2·39	8·12	1·01	13·56
—	—	—	—	—	·4	—	—	—	·02
2·8	1·41	2·82	—	·21	4·8	·94	2·54	1·38	·87
118·6	—	—	—	12·18	41·4	—	—	—	3·79
85·4	—	2·12	2·82	7·29	53·5	·15	2·54	·72	3·98
290·4	—	—	—	23·49	144·6	—	·22	—	9·57
—	—	—	—	—	—	—	—	—	—
45·9	—	—	—	1·13	6·8	—	—	—	·19
—	—	—	—	—	—	·07	—	—	—
6·4	·71	·71	—	·34	3·2	·15	·07	—	·16
26·8	—	1·41	—	1·78	20·4	—	·80	·29	·98
18·4	—	2·82	—	·86	22·3	·07	4·61	2·17	·99
24·0	—	·71	—	1·14	9·9	·51	·87	·22	·74
21·9	·71	2·82	·71	1·36	4·9	·44	·43	·44	·32
2·8	·71	1·41	·71	·48	1·2	·07	·80	·73	·25
11·3	—	—	·71	·83	8·0	—	·72	·44	·44
79·7	—	9·17	4·23	4·69	15·7	—	1·01	·58	·65
17·6	—	6·35	3·53	2·04	13·9	1· 9	3·55	2·83	1·10
36·0	—	—	1·41	1·50	26·8	·76	1·30	·35	1·50
145·4	—	4·23	·71	4·50	94·5	·72	2·10	·80	3·88
29·6	—	—	—	3·61	27·1	—	·29	·29	2·73
2·1	—	—	—	·06	3·6	·22	·36	·15	·33
203·3	—	1·41	1·41	14·16	134·2	·07	·07	·07	10·29
13·4	—	—	—	·72	8·7	—	·80	·72	·55
52·9	—	—	—	1·75	23·9	—	·22	·07	1·00
124·9	—	·71	—	4·54	46·8	—	·15	—	1·91
1·4	1·41	—	—	·06	1·7	1·67	—	—	·09
139·0	1·41	·71	1·41	5·62	86·6	1·01	·72	·72	3·47
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	·1	—	—	—	—
·7	—	—	—	·01	·8	—	—	—	·03
—	—	—	—	—	—	—	—	—	—
2096·1	7·76	51·51	20·47	114·38	1324·7	11·31	33·34	11·28	64·97

ABSTRACT No. XIV.—TABLE showing the AVERAGE STRENGTH, ADMIS-
among the TROOPS stationed in the STRAITS SETTLEMENTS during
Ratios for 10 years.

Average Strength, 1,352.	Admissions into Hospital.	Deaths.			Invalids.		Average number constantly Sick.
Diseases.		In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.	
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	—	—	—	—	—	—	—
Influenza	4	—	—	—	—	—	·30
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	3	1	—	1	—	—	·33
Other Continued Fevers	28	—	—	—	—	—	·95
Cholera	—	—	—	—	—	—	—
Dysentery	5	1	—	1	—	—	·35
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	303	—	1	1	—	—	11·26
Septic Diseases	—	—	—	—	—	—	—
Tubercular Diseases	4	—	—	—	1	1	·59
Syphilis, Primary	117	—	—	—	—	—	12·40
,, Secondary	146	—	—	—	3	5	15·36
Gonorrhœa	154	—	—	—	—	—	11·09
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	15	—	—	—	—	—	·28
Scurvy	—	—	—	—	—	—	—
Alcoholism	4	—	—	—	—	—	·10
Rheumatism	37	—	—	—	—	2	1·79
Debility	16	—	—	—	3	1	2·16
Other General Diseases	2	—	—	—	—	—	·11
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	5	2	—	2	1	2	·28
Nervous System { Mental	1	—	—	—	1	1	·27
Eye	15	—	—	—	—	—	·87
Other Organs of Special Sense	21	—	—	—	—	—	1·49
Circulatory System	6	—	—	—	1	1	1·60
Respiratory ,,	19	1	—	1	1	1	1·40
Digestive ,,	73	—	—	—	2	—	3·42
Lymphatic ,,	49	—	—	—	1	1	4·87
Urinary ,,	4	—	—	—	—	—	·32
Generative ,,	125	—	—	—	—	—	9·81
Organs of Locomotion	18	—	—	—	1	1	·91
Connective Tissue	44	—	—	—	—	—	1·62
Skin	41	—	—	—	—	—	1·66
INJURIES.							
General	1	3	—	3	—	—	—
Local	95	—	—	—	—	—	4·13
In Action	—	—	—	—	—	—	—
POISONS	—	—	—	—	—	—	—
No appreciable disease	2	—	—	—	—	—	·09
Cause unknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	1,357	8	1	9	15	16	89·81

SIONS into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK the year 1897, with the Ratios per 1,000 of the Strength, and the Average

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally discharged.	Constantly Sick.
—	—	—	—	—	·2	—	—	—	·01
—	—	—	—	—	·2	—	—	—	·01
3·0	—	—	—	·22	2·0	—	—	—	·07
—	—	—	—	—	—	—	—	—	—
2·2	·74	—	—	·24	2·2	·90	—	—	·35
20·7	—	—	—	·70	56·8	—	·08	—	2·03
—	—	—	—	—	—	—	—	—	—
3·7	·74	—	—	·26	7·4	·16	·66	·08	·80
—	—	—	—	—	—	—	—	—	—
224·1	·74	—	—	8·33	78·4	·58	·25	—	2·51
—	—	—	—	—	·2	—	—	—	—
3·0	—	·74	·74	·44	2·7	·99	1·81	·98	·72
86·5	—	—	—	9·17	124·0	—	—	—	11·08
108·0	—	2·22	3·70	11·36	111·2	·33	5·17	1·07	11·55
113·9	—	—	—	8·20	161·2	—	·49	·16	11·24
—	—	—	—	—	·1	·08	—	—	—
11·1	—	—	—	·21	17·7	—	—	—	·49
—	—	—	—	—	—	—	—	—	—
3·0	—	—	—	·07	6·2	·08	—	—	·27
27·4	—	—	1·48	1·32	13·8	—	·82	·16	1·74
11·8	—	2·22	·74	1·60	14·1	—	1·64	1·23	1·49
1·5	—	—	—	·08	7·1	·16	—	—	·47
3·7	1·48	·74	1·48	·21	6·8	·58	·49	·33	·34
·7	—	·74	·74	·20	1·5	—	1·15	1·23	·18
11·1	—	—	—	·64	19·1	—	·41	·25	1·01
15·5	—	—	—	1·10	14·4	—	·08	·08	·55
4·4	—	·74	·74	1·18	4·6	·25	1·40	1·39	·67
14·1	·74	·74	·74	1·04	19·8	·57	1·07	·25	1·51
54·0	—	1·48	—	2·53	69·9	·57	·66	·25	2·91
36·2	—	·74	·74	3·60	41·0	—	·16	·08	5·05
3·0	—	—	—	·24	2·3	·16	·33	·25	·31
92·5	—	—	—	7·26	98·5	·08	·49	·66	6·85
13·3	—	·74	·74	·67	7·7	—	·41	·41	·51
32·5	—	—	—	1·20	30·3	—	·08	—	1·35
30·3	—	—	—	1·23	50·5	—	—	·08	2·52
·7	2·22	—	—	—	2·1	·99	—	—	·15
70·3	—	—	—	3·06	94·7	·25	·49	·33	4·01
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	·2	—	—	—	—
1·5	—	—	—	·07	3·2	—	—	—	·13
—	—	—	—	—	—	—	—	—	—
1,003·7	6·66	11·09	11·83	66·43	1,072·1	6·73	18·14	9·27	72·48

ABSTRACT No. IX.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS
the NON-EUROPEAN TROOPS stationed in WESTERN AFRICA during the Year 1897,

Average Strength, 822	Admissions into Hospital.	Deaths.			Invalids.		Average Number constantly Sick.
Diseases.		In the Command.	Of Invalids.	Total.	Number sent to West Indies.	Number finally Discharged the Service.	
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	7	—	—	—	—	—	·11
Influenza	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	—	—	—	—	—	—	—
Other Continued Fevers	—	—	—	—	—	—	—
Cholera	—	—	—	—	—	—	—
Dysentery	9	1	—	1	—	—	·19
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	575	—	—	—	12	1	16·79
Septic Diseases	1	—	—	—	—	—	·04
Tubercular Diseases	9	7	1	8	12	5	3·12
Syphilis, Primary	22	—	—	—	—	—	2·59
„ Secondary	55	—	—	—	21	6	8·45
Gonorrhœa	77	—	—	—	1	—	5·23
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	19	—	—	—	—	—	·59
Scurvy	—	—	—	—	—	—	—
Alcoholism	—	—	—	—	—	—	—
Rheumatism	62	—	—	—	8	1	3·78
Debility	2	—	—	—	5	—	·05
Other General Diseases	4	—	—	—	—	—	·22
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	1	—	—	—	2	1	·02
Nervous System { Mental	1	—	—	—	1	1	·42
Eye	18	—	—	—	—	—	·93
Other Organs of Special Sense	3	—	—	—	1	—	·15
Circulatory System	8	1	1	2	11	5	·33
Respiratory „	38	3	1	4	4	—	1·64
Digestive „	34	—	—	—	1	—	1·03
Lymphatic „	22	—	—	—	1	—	2·95
Urinary „	1	1	—	1	2	2	·04
Generative „	65	—	—	—	1	2	3·98
Organs of Locomotion	12	—	—	—	5	4	·72
Connective Tissue	26	—	—	—	—	—	·91
Skin	44	—	—	—	3	1	3·07
INJURIES.							
ral	—	—	—	—	—	—	—
l	58	—	—	—	—	—	3·35
tion	—	—	—	—	—	—	—
POISONS	—	—	—	—	—	—	—
siable disease	—	—	—	—	—	—	—
iknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	1,173	13	3	16	91	29	60·70

sions into Hospital, Deaths, Numbers Invalided and Constantly Sick, Ratios per 1,000 of the Strength, and the Average Ratios for 10 Years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
·4	·06	—	—	·04	·8	·08	—	—	·08
1·1	—	—	—	·10	1·2	·01	—	—	·05
·1	—	—	—	·01	—	—	—	—	—
4·2	·02	—	—	·15	7·5	·03	—	—	·27
·1	·02	—	—	·01	—	·01	—	—	—
31·8	8·62	·65	·02	4·60	20·0	5·29	·29	·02	2·84
42·6	·02	·12	·02	1·93	49·7	·03	·03	·01	2·03
1·8	1·24	—	—	·04	1·9	1·25	—	—	·05
34·3	1·27	1·24	·14	2·59	28·1	·67	1·04	·18	1·93
—	—	—	—	—	—	—	—	—	—
364·1	·70	2·56	·35	14·29	351·0	·70	2·00	·39	11·56
1·9	·15	·02	·02	·14	1·6	·10	—	—	·10
5·1	·80	2·37	1·63	·92	4·1	·82	1·60	1·18	·74
125·6	·02	·06	·05	12·11	127·5	—	·03	—	10·91
106·2	·40	9·47	5·52	11·65	62·2	·12	3·32	1·15	6·33
190·7	—	·70	·35	15·65	176·3	—	·17	·05	12·90
—	·03	—	—	—	—	·04	—	—	—
11·0	—	—	—	·38	11·3	—	·01	—	·37
·4	—	—	—	·02	·5	—	—	—	·02
5·2	·03	·06	·03	·22	7·4	·07	·01	—	·24
29·8	·02	1·21	·45	2·26	29·6	·05	·94	·37	2·08
18·5	·03	2·77	1·15	1·36	23·2	·04	3·27	1·35	1·55
5·7	·14	·28	·05	·45	10·0	·15	·51	·15	·66
6·6	·40	·96	1·04	·46	8·4	·34	1·04	·79	·59
1·7	·02	1·47	1·50	·44	1·7	·01	1·22	1·28	·49
11·3	—	·46	·46	·73	12·7	—	·57	·54	·79
14. 9	—	1·07	1·13	·87	15·0	·01	·86	·68	·78
11·3	·60	3·32	2·76	1·11	10·3	·29	2·63	2·20	1·06
25·0	·59	·43	·29	1·61	33·9	·92	·62	·31	1·92
121·0	1·87	2·39	·77	5·81	127·0	1·78	1·94	·65	5·45
31·9	·05	·32	·09	3·95	32·3	·03	·40	·16	3·57
2·0	·20	·25	·22	·18	2·0	·18	·30	·18	·21
99·7	·02	·22	·17	7·98	88·2	·02	·28	·21	6·19
11·8	·05	1·22	·96	·95	8·1	·03	·75	·58	·62
21·9	—	·05	·03	1·09	22·0	·01	·11	·03	1·05
53·0	—	·23	·08	2·32	60·0	—	·14	·05	2·56
4·3	1·22	·14	·09	·26	3·3	1·40	·12	·04	·18
100·2	·59	·88	·79	4·72	102·4	·70	·93	·64	4·58
—	·03	—	—	·03	·1	·02	·02	·05	·01
·8	·05	·03	—	·02	·5	·10	·02	—	·01
2·4	—	—	—	·10	2·1	—	—	—	·10
—	—	—	—	—	—	—	—	—	—
1,500·4	19·25	31·99	20·16	101·33	1,443·9	15·50	25·17	13·24	84·07

ABSTRACT No. XVI.—TABLE showing the PREVALENCE and MORTALITY of
with the ratios per 1,000 of Strength, during the year 1897.

Military Districts.	Pre-sidency.		Allaha-bad.		Oudh.		Rohil-khand.		Nar-budda.	
Average Strength.	2,761		2,244		4,589		2,719		1,068	
Diseases,	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
GENERAL DISEASES.										
Small-pox	1	1	1	—	6	—	—	—	—	—
Other Eruptive Fevers	1	—	2	—	5	—	—	—	—	—
Plague	—	—	—	—	—	—	—	—	—	—
Influenza	—	—	5	—	147	—	32	—	—	—
Diphtheria	—	—	—	—	1	1	—	—	—	—
Enteric Fever	29	1	99	27	153	43	42	13	26	8
Other Continued Fevers	81	—	233	—	321	—	135	—	5	—
Cholera	2	2	4	2	68	43	—	—	—	—
Dysentery	154	10	100	5	177	6	103	—	38	3
Yellow Fever	—	—	—	—	—	—	—	—	—	—
Malarial Fevers	978	4	591	—	1,190	—	373	1	897	2
Septic Diseases	1	1	—	—	2	—	3	1	3	—
Tubercular Diseases	14	4	10	1	17	2	15	—	2	—
Syphilis, Primary...	214	—	344	—	719	—	576	—	210	—
,, Secondary	194	—	278	1	535	—	494	3	162	—
Gonorrhœa...	441	—	654	—	1,018	—	852	—	258	—
Hydrophobia	—	—	—	—	—	—	—	—	—	—
Parasitic Diseases	43	—	45	—	34	—	12	—	6	—
Scurvy	1	—	—	—	—	—	—	—	—	—
Alcoholism...	9	—	5	—	14	—	13	1	3	—
Rheumatism	63	—	51	—	69	—	93	—	27	1
Debility	69	—	22	—	63	—	57	—	14	—
Other General Diseases	22	—	14	—	22	—	18	—	4	—
LOCAL DISEASES.										
Diseases of the—										
Nervous System { Nervous Diseases ...	21	—	7	—	20	1	28	2	3	—
Nervous System { Mental ,, ...	9	—	5	—	4	—	6	—	—	—
Eye	40	—	20	—	35	—	30	—	20	—
Other Organs of Special Sense	33	—	33	—	87	—	28	—	20	—
Circulatory System	43	1	18	4	46	2	69	2	15	—
Respiratory ,, ...	83	3	43	2	70	—	102	1	20	—
Digestive ,, ...	357	17	291	6	469	9	469	3	171	4
Lymphatic and Glandular System ..	99	—	52	—	141	1	54	—	61	—
Urinary System	7	1	—	—	4	—	4	—	2	1
Generative System...	281	—	396	—	358	—	132	—	177	—
Organs of Locomotion	34	—	16	1	28	—	70	—	9	—
Connective Tissue	81	—	46	—	96	—	57	—	19	—
Skin	178	—	174	—	270	—	104	—	65	—
INJURIES.										
General	14	2	12	4	23	9	4	1	2	—
Local	242	2	199	—	337	2	323	3	97	1
In Action	—	—	—	—	—	—	—	—	—	—
POISONS	1	1	1	—	4	—	—	—	—	—
No appreciable disease	8	—	3	—	14	—	1	—	4	—
Cause unknown (refers to deaths only) ...	—	—	—	—	—	—	—	—	—	—
General Total	3,818	50	3,774	53	6,567	119	4,288	31	2,340	20

the DIFFERENT CLASSES of DISEASES in each of the MILITARY DISTRICTS in INDIA

Bundelkhand.		Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Madras.		Southern.		Bangalore.		Belgaum.	
2,273		4,131		3,912		4,452		5,381		2,853		1,105		1,365		1,667		1,499	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
—	—	2	—	—	—	4	3	—	—	—	—	—	—	—	—	—	—	—	—
2	—	35	—	2	—	2	—	3	—	1	—	—	—	2	—	3	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	2	—	17	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—
—	—	1	—	—	—	1	—	1	—	—	—	—	—	1	—	—	—	—	—
245	67	175	50	281	55	71	16	150	38	179	78	11	5	23	7	67	12	12	3
163	—	41	—	47	—	228	—	150	—	1	—	69	—	7	—	162	—	1	—
5	5	10	9	2	1	1	—	—	—	—	—	—	—	—	—	—	—	4	2
111	7	62	2	96	6	92	3	160	7	166	12	88	3	33	—	92	1	58	1
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1,419	1	1,855	—	953	2	2,690	6	1,802	3	2,093	8	214	1	80	—	85	2	367	—
2	—	5	—	32	3	14	—	20	—	9	1	2	1	—	—	—	—	—	—
6	—	26	—	9	2	20	4	23	7	21	3	15	2	2	—	5	—	34	2
290	—	399	—	475	—	400	—	849	—	106	—	164	1	125	—	207	—	315	—
248	2	534	—	286	1	379	1	356	3	184	—	157	—	123	1	235	—	339	1
678	—	780	—	616	—	845	—	817	—	457	—	210	—	223	—	293	—	227	—
—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	—	30	—	32	—	40	—	21	—	19	—	18	—	23	—	8	—	13	—
7	—	9	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—
10	—	33	—	20	—	45	—	26	—	4	—	6	—	4	—	4	—	10	—
55	—	123	—	126	—	164	—	141	—	116	—	44	—	33	—	38	—	51	—
41	—	49	—	67	—	124	—	60	1	87	—	53	—	28	—	38	—	5	—
10	—	16	—	11	—	27	1	20	2	33	—	13	—	10	1	11	—	8	—
25	—	29	3	17	—	40	1	31	1	18	5	9	—	4	—	16	—	14	1
2	—	4	—	4	—	8	—	10	—	2	—	4	—	2	—	7	—	2	—
48	—	49	—	41	—	58	—	40	—	26	—	20	—	5	—	30	—	17	—
56	—	62	—	53	—	75	—	47	—	39	—	25	—	21	—	15	—	18	—
35	1	43	3	36	—	52	2	44	5	13	5	17	—	12	—	10	2	16	1
46	3	79	2	64	2	112	4	194	6	101	8	24	—	28	—	24	—	41	—
305	6	537	6	559	3	551	4	524	6	365	5	113	—	96	2	174	5	143	4
87	—	134	—	102	—	131	—	113	1	56	—	60	—	73	—	85	—	42	—
3	2	10	—	10	1	13	3	6	2	13	—	2	—	1	—	1	—	1	—
315	—	701	—	408	—	381	—	194	—	337	—	121	—	75	—	89	—	49	—
23	1	72	—	51	—	78	1	49	—	30	—	10	—	17	—	21	—	22	—
71	—	75	—	88	—	93	—	107	—	46	—	40	—	34	—	50	—	26	—
157	—	232	—	186	—	247	—	162	—	111	—	102	—	54	—	92	—	57	—
31	9	15	8	25	—	30	4	15	4	14	3	3	3	1	—	2	3	1	—
211	—	402	3	423	3	407	2	523	3	279	3	96	2	222	2	226	—	127	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	—	33	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	1	—
10	—	12	—	10	—	2	—	14	—	5	—	1	—	8	—	1	—	5	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4,728	104	6,895	86	5,180	81	7,425	55	6,667	89	4,932	131	1,711	18	1,370	13	2,032	25	2,025	15

ABSTRACT No. XVI.—TABLE showing the PREVALENCE and MORTALITY of in INDIA with the ratios per 1,000 of Strength during the year 1897—

Military Districts.	Secunderabad.		Rangoon.		Mandalay.		Poona.		Mhow.	
Average strength.	2,622		2,141		1,918		3,537		2,801	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
GENERAL DISEASES.										
Small-pox ...	2	—	—	—	2	—	—	—	—	—
Other Eruptive Fevers ...	—	—	—	—	—	—	1	—	11	—
Plague ...	—	—	—	—	—	—	2	—	—	—
Influenza ...	4	—	62	—	1	—	—	—	1	—
Diphtheria ...	—	—	—	—	—	—	—	—	—	—
Enteric Fever ...	95	23	25	8	3	3	81	21	114	44
Other Continued Fevers ...	228	—	235	—	148	—	55	—	88	—
Cholera ...	4	2	—	—	—	—	2	—	4	3
Dysentery ...	151	4	77	2	56	3	52	—	85	2
Yellow Fever ...	—	—	—	—	—	—	—	—	—	—
Malarial Fevers ...	372	—	103	—	584	5	1,295	1	1,227	2
Septic Diseases ...	—	—	2	—	—	—	7	—	1	—
Tubercular Diseases ...	15	2	3	1	13	2	8	1	10	2
Syphilis, Primary ...	654	—	413	—	345	—	255	—	419	—
,, Secondary ...	308	2	295	1	218	1	346	1	407	—
Gonorrhœa ...	465	—	461	—	342	—	630	—	530	—
Hydrophobia ...	—	—	—	—	1	1	—	—	—	—
Parasitic Diseases ...	11	—	150	—	19	—	41	—	14	—
Scurvy ...	—	—	—	—	—	—	1	—	1	—
Alcoholism ...	7	—	3	—	19	—	36	—	12	—
Rheumatism ...	30	—	77	—	59	—	70	—	141	—
Debility ...	17	—	55	—	20	—	44	—	29	—
Other General Diseases ...	14	—	30	—	8	—	17	—	24	1
LOCAL DISEASES.										
Diseases of the—										
Nervous System { Nervous Diseases ...	19	1	12	2	12	1	21	2	22	—
Nervous System { Mental ,, ...	2	—	3	—	4	—	4	—	4	—
Eye ...	48	—	8	—	28	—	34	—	20	—
Other Organs of Special Sense ...	16	—	42	—	36	—	34	—	31	—
Circulatory System ...	23	1	16	2	13	—	13	2	31	—
Respiratory ,, ...	88	—	41	—	72	2	71	—	82	1
Digestive ,, ...	256	4	223	3	248	1	412	8	479	6
Lymphatic and Glandular System ...	124	—	72	—	76	—	74	—	137	—
Urinary System ...	4	—	2	—	6	—	14	1	4	—
Generative System ...	138	—	179	1	132	—	302	—	254	—
Organs of Locomotion ...	32	—	21	—	29	—	34	—	56	—
Connective Tissue ...	64	—	67	—	57	—	55	—	75	—
Skin ...	74	—	120	—	143	—	147	—	165	—
INJURIES.										
General ...	4	5	5	2	—	1	6	3	5	3
Local ...	277	3	240	—	191	2	358	—	308	—
In Action ...	—	—	—	—	—	—	—	—	—	—
POISONS ...	—	—	—	—	—	—	3	—	1	—
No appreciable disease ...	10	—	8	—	10	—	5	—	6	—
Cause unknown (refers to deaths only) ...	—	—	—	—	—	—	—	—	—	—
General Total ...	3,556	47	3,059	22	2,895	22	4,529	40	4,898	64

the DIFFERENT CLASSES OF DISEASES in each of the MILITARY DISTRICTS concluded.

Bombay.		Deesa.		Aden.		Sind.		Nagpur.		Quetta.		Marching.		Total.	
2 060		652		1,068		1,470		918		2,307		1,068		64,531	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1	—	3	—	1	—	—	—	—	—	—	—	1	—	24	4
—	—	—	—	—	—	—	—	—	—	4	—	—	—	74	—
3	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	272	1
—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1
19	3	17	8	—	—	10	5	10	4	52	11	61	3	2,050	556
81	1	23	—	145	—	—	—	92	—	4	—	7	—	2,750	1
3	3	—	—	—	—	1	1	1	1	—	—	5	6	116	80
60	—	13	—	30	—	44	—	9	—	48	3	70	2	2,215	82
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
648	—	488	2	275	1	1,495	—	332	—	332	2	658	1	23,496	44
2	1	1	—	1	1	1	—	—	—	12	—	2	—	122	9
39	3	2	1	6	—	4	—	1	—	8	1	2	—	330	40
150	—	38	—	114	—	79	—	44	—	159	—	55	—	8 108	1
265	2	80	—	88	2	71	—	69	—	177	—	26	—	6,853	22
292	—	157	—	160	—	206	—	275	—	318	—	132	—	12,307	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
21	—	5	—	16	—	50	—	5	—	8	—	5	—	707	—
—	—	—	—	—	—	1	—	—	—	—	—	1	—	23	—
3	—	7	—	3	—	10	—	12	—	17	—	1	1	336	2
83	—	15	—	62	—	49	—	22	—	100	—	18	—	1,920	1
79	—	40	—	28	—	20	—	12	—	33	—	35	—	1,194	1
8	1	2	—	1	—	7	1	6	—	15	1	1	—	372	8
28	1	6	1	3	1	10	1	4	1	8	1	1	—	428	26
12	1	3	—	—	—	3	—	—	—	7	—	—	—	111	1
28	—	9	—	19	—	21	—	13	—	19	—	2	—	727	—
28	—	11	—	15	—	63	—	27	—	39	—	5	—	960	—
86	2	9	1	6	—	27	2	1	—	34	—	11	—	728	38
52	2	35	—	10	—	28	—	16	—	63	1	22	1	1,616	38
227	5	109	4	75	1	175	1	82	1	300	2	97	—	7,807	118
53	—	32	—	20	—	40	—	45	1	75	—	19	—	2,057	3
6	1	—	—	3	—	5	—	—	—	5	1	—	—	126	13
249	—	172	—	119	—	97	—	279	—	427	—	73	—	6 435	1
31	—	10	—	4	—	17	—	8	—	24	—	4	—	760	3
35	—	16	—	21	—	26	—	27	—	30	—	13	—	1,412	—
93	—	92	—	66	—	154	—	85	—	73	—	20	—	3,423	—
6	2	18	3	6	—	7	2	5	2	1	1	22	4	277	78
178	1	94	2	101	1	169	2	113	—	264	—	60	1	6,466	38
—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2
—	—	—	—	1	—	—	—	1	—	—	—	—	1	51	2
—	—	—	—	1	—	11	—	—	—	10	—	—	—	159	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2,869	29	1,509	22	1,400	7	2,901	15	1,616	10	2,651	24	1,429	22	96,824	1,214

ABSTRACT No. XII.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS the Troops stationed at CEYLON during the Year 1897, with the Ratios

Average Strength, 1,324.		Deaths.			Invalids.		
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service	Average Number constantly Sick.
GENERAL DISEASES.							
Small-pox	—	—	—	—	—	—	—
Other Eruptive Fevers	2	—	—	—	—	—	·09
Influenza	—	—	—	—	—	—	—
Diphtheria	—	—	—	—	—	—	—
Enteric Fever	4	1	—	1	—	—	·34
Other Continued Fevers	38	—	—	—	—	—	1·67
Cholera	—	—	—	—	—	—	—
Dysentery	17	—	—	—	—	—	1·15
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	349	3	—	3	2	—	9·07
Septic Diseases	1	1	—	1	—	—	·08
Tubercular Diseases	1	—	1	1	1	—	·20
Syphilis, Primary	134	—	—	—	—	—	10·77
,, Secondary	54	—	—	—	—	—	3·77
Gonorrhœa	169	—	—	—	2	—	13·49
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	48	—	—	—	—	—	1·23
Scurvy	—	—	—	—	—	—	—
Alcoholism	6	—	—	—	—	—	·16
Rheumatism	20	—	—	—	—	—	1·85
Debility	20	—	—	—	1	1	1·30
Other General Diseases	8	—	—	—	—	—	·41
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	5	—	—	—	—	—	·14
Nervous System { Mental	1	—	—	—	—	—	·17
Eye	16	—	—	—	—	1	·47
Other Organs of Special Sense	22	—	—	—	2	2	1·12
Circulatory System	13	—	—	—	2	2	1·47
Respiratory ,,	15	—	—	—	1	—	·69
Digestive ,,	84	2	—	2	1	1	3·23
Lymphatic ,,	66	—	—	—	—	—	7·20
Urinary ,,	4	—	—	—	1	—	·43
Generative ,,	35	—	—	—	—	—	1·75
Organs of Locomotion	18	—	—	—	1	1	1·02
Connective Tissue	36	—	—	—	—	—	1·75
Skin	133	—	—	—	—	—	4·64
INJURIES.							
General	—	—	—	—	—	—	—
Local	121	—	—	—	—	—	5·51
In Action	—	—	—	—	—	—	—
POISONS	—	—	—	—	—	—	—
No appreciable disease	3	—	—	—	—	—	·29
Cause unknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	1443	7	1	8	14	8	75·76

of Strength.

Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Madras.		Southern.		Bangalore.		Belgaum.	
4,131		3,842		4,452		5,381		2,853		1,105		1,365		1,667		1,499	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
·5	—	—	—	·9	·67	—	—	—	—	—	—	—	—	—	—	—	—
8·5	—	·5	—	·4	—	·6	—	·4	—	—	—	1·5	—	1·8	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
·5	—	4·4	·26	—	—	—	—	—	—	—	—	—	—	·6	—	—	—
·2	—	—	—	·2	—	·2	—	—	—	—	—	·7	—	—	—	—	—
42·4	12·10	73·1	14·32	15·9	3·59	27·9	7·06	62·7	27·34	10·0	4·52	16·8	5·13	40·2	7·20	8·0	2·00
9·9	—	12·2	—	51·3	—	27·9	—	·4	—	62·4	—	5·1	—	97·2	—	·7	—
2·4	2·18	·5	·26	·2	—	—	—	—	—	—	—	—	—	—	—	2·7	1·33
15·0	·48	25·0	1·56	20·7	·67	27·9	1·30	58·2	4·21	79·6	2·71	24·2	—	55·2	·60	38·7	·67
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
449·0	—	248·0	·52	604·2	1·35	334·9	·56	733·6	2·80	193·7	·90	58·6	—	51·0	1·20	244·8	—
1·2	—	8·3	·78	3·1	—	3·7	—	3·2	·35	1·8	·90	—	—	—	—	—	—
6·3	—	2·3	·52	4·5	·90	4·3	1·30	7·4	1·05	13·6	1·81	1·5	—	3·0	—	22·7	1·33
94·2	—	123·6	—	89·8	—	157·8	—	37·2	—	148·4	·90	91·6	—	124·2	—	210·1	—
129·3	—	74·4	·26	85·1	·22	66·0	·56	64·5	—	142·1	—	90·1	·73	141·0	—	226·2	·67
181·6	—	160·3	—	189·8	—	151·9	—	160·2	—	190·0	—	163·4	—	175·8	—	151·4	—
—	—	·3	·26	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7·3	—	8·3	—	9·0	—	3·9	—	6·7	—	16·3	—	16·8	—	4·8	—	8·7	—
2·2	—	—	—	—	—	·2	—	·4	—	—	—	—	—	—	—	—	—
8·0	—	5·2	—	10·1	—	4·8	—	1·4	—	5·4	—	2·9	—	2·4	—	6·2	—
29·8	—	32·8	—	36·8	—	26·2	—	40·7	—	39·8	—	24·2	—	22·8	—	34·0	—
11·9	—	17·4	—	27·9	—	11·2	·19	30·5	—	48·0	—	20·5	—	22·8	—	3·3	—
3·9	—	2·9	—	6·1	·22	3·7	·37	11·6	—	11·8	—	7·3	·73	6·6	—	5·3	—
7·0	·73	4·4	—	9·0	·22	5·8	·19	6·3	1·75	8·1	—	2·9	—	9·6	—	9·3	·67
1·0	—	1·0	—	1·8	—	1·9	—	·7	—	3·6	—	1·5	—	4·2	—	1·3	—
11·6	—	10·7	—	13·0	—	7·4	—	9·1	—	18·1	—	3·7	—	18·0	—	11·3	—
13·0	—	13·8	—	16·8	—	8·7	—	13·7	—	22·6	—	15·4	—	9·0	—	12·0	—
10·4	·73	9·4	—	11·7	·45	8·2	·93	4·6	1·75	15·1	—	8·8	—	6·0	1·20	10·0	·67
19·1	·48	16·7	·52	25·2	·90	37·0	1·12	35·4	2·80	21·7	—	20·5	—	14·4	—	27·4	—
130·0	1·45	145·5	·78	123·8	·90	97·4	1·12	127·9	1·75	102·3	—	70·3	1·47	104·4	3·00	95·4	2·67
32·4	—	26·5	—	29·4	—	21·0	·19	19·6	—	54·3	—	53·5	—	51·0	—	28·0	—
2·4	—	2·6	·26	2·9	·67	1·1	·37	4·6	—	1·8	—	·7	—	·6	—	·7	—
170·0	—	106·2	—	85·6	—	36·1	—	118·1	—	109·5	—	54·9	—	53·4	—	32·7	—
7·7	—	13·3	—	17·5	·22	9·1	—	10·5	—	9·0	—	12·5	—	12·6	—	14·7	—
18·2	—	22·9	—	20·2	—	19·9	—	16·1	—	36·2	—	24·9	—	30·0	—	17·3	—
56·2	—	48·4	—	55·5	—	30·1	—	38·9	—	92·3	—	39·6	—	55·2	—	38·0	—
3·6	1·94	6·5	—	6·7	·90	2·8	·74	4·9	1·05	2·7	2·71	·7	—	1·2	1·80	·7	—
97·3	·73	110·1	·78	91·4	·45	97·2	·56	97·8	1·05	86·9	1·81	162·6	1·47	135·6	—	84·7	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8·0	—	—	—	·7	—	—	—	—	—	—	—	—	—	—	—	·7	—
2·9	—	2·6	—	·4	—	2·6	—	1·8	—	·9	—	5·9	—	·6	—	3·3	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1596·5	20·82	1340·4	21·08	1667·3	12·35	1239·0	16·54	1728·7	45·92	1548·4	16·29	1003·7	9·52	1254·9	15·00	1350·9	10·01

Ratios per 1,000

Military Districts.	Secunderabad.		Rangoon.		Mandalay.		Poona.		Mhow.	
Average Strength	2,622		2,141		1,918		3,537		2,801	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
GENERAL DISEASES.										
Small-pox	·8	—	—	—	1·0	—	—	—	—	—
Other Eruptive Fevers	—	—	—	—	—	—	·3	—	3·9	—
Plague	—	—	—	—	—	—	·6	—	—	—
Influenza	1·5	—	29·0	—	·5	—	—	—	·4	—
Diphtheria	—	—	—	—	—	—	—	—	—	—
Enteric Fever...	36·2	8·77	11·7	3·74	1·6	1·56	22·9	5·94	40·7	15·71
Other Continued Fevers	87 0	—	109·8	—	77·2	—	15·5	—	31·4	—
Cholera...	1·5	·76	—	—	—	—	·6	—	1·4	1·07
Dysentery	57·6	1·53	36·0	·93	29·2	1·56	14·7	—	30·3	·71
Yellow Fever	—	—	—	—	—	—	—	—	—	—
Malarial Fevers	141·9	—	48·1	—	304·5	2·61	366·1	·28	473·8	·71
Septic Diseases	—	—	·9	—	—	—	2·0	—	—	—
Tubercular Diseases...	5·7	·76	1·4	·47	6·8	1·04	2·3	·28	3·6	·71
Syphilis, Primary	249·4	—	192·9	—	179·9	—	72·1	—	149·6	—
,, Secondary	117·5	·76	137·8	·47	113·7	·52	97·8	·28	145·3	—
Gonorrhœa	177·3	—	215·3	—	178·3	—	178·1	—	189·2	—
Hydrophobia	—	—	—	—	·5	·52	—	—	—	—
Parasitic Diseases	4·2	—	74·3	—	9·9	—	11·6	—	5·0	—
Scurvy	—	—	—	—	—	—	·3	—	·4	—
Alcoholism	2·7	—	1·4	—	9·9	—	10·2	—	4·3	—
Rheumatism	11·4	—	36·0	—	30·8	—	19·8	—	50·3	—
Debility	6·5	—	25·7	—	10·4	—	12·4	—	10·4	—
Other General Diseases	5·3	—	14·0	—	4·2	—	4·8	—	8·6	·36
LOCAL DISEASES.										
Diseases of the—										
Nervous System { Nervous ...	7·2	·38	5·6	·93	6·3	·52	5·9	·57	7·9	—
Nervous System { Mental	·8	—	1·4	—	2·1	—	1·1	—	1·4	—
Eye	18·3	—	3·7	—	14·6	—	9·6	—	7·1	—
Other Organs of Special Sense ...	6·1	—	19·6	—	18·8	—	9·3	—	11·1	—
Circulatory System	8·8	·38	7·5	·93	6·8	—	3·7	·57	11·1	—
Respiratory ,, ...	33·6	—	19·1	—	37·5	1·04	20·1	—	29·3	·36
Digestive	97·6	1·53	104·2	1·40	129·3	·52	116·5	2 26	171·0	2·14
Lymphatic and Glandular System ...	47·3	—	33·6	—	39·6	—	20·9	—	48·9	—
Urinary System	1·5	—	·9	—	3·1	—	4·0	·28	1·4	—
Generative System	52·6	—	83·6	·47	68·8	—	85·4	—	90·7	—
Organs of Locomotion	12·2	—	9·8	—	15·1	—	9·6	—	20·0	—
Connective Tissue	24·4	—	31·3	—	29·7	—	15·5	—	26·8	—
Skin	28·2	—	56·0	—	74·6	—	41·6	—	58·9	—
INJURIES.										
General	1·5	1·91	2·3	·93	—	·52	1·7	·85	1·8	1·
Local	105·6	1·14	112·1	—	99·6	1·04	101·2	—	110·0	—
In Action	—	—	—	—	—	—	—	—	—	—
POISONS	—	—	—	—	—	—	·8	—	·1	—
No appreciable disease	3·8	—	3·7	—	5·2	—	1·4	—	2·1	—
Cause unknown (refers to deaths only)...	—	—	—	—	—	—	—	—	—	—
General Total	1356·2	17·93	1428·8	10·28	1509·4	11·47	1290·5	11·31	1748·7	22·8

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK, Ratios per 1,000 of the Strength, and the Average Ratios for 10 years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home	Invalids finally Discharged.	Constantly Sick.
—	—	—	—	—	1·1	—	—	—	·08
—	—	—	—	—	·1	—	—	—	·01
—	—	—	—	—	2·9	—	—	—	·10
—	—	—	—	—	·1	—	—	—	·01
·7	·71	—	—	·16	2·1	·58	·15	—	·28
3·5	—	—	—	·30	19·3	—	—	—	·67
—	—	—	—	—	·5	·44	—	—	—
·7	—	—	—	·01	13·0	·36	·87	—	·73
—	—	—	—	—	—	—	—	—	—
592·8	·71	14·11	2·82	19·56	479·8	2·39	8·12	1·01	13·56
—	—	—	—	—	·4	—	—	—	·02
2·8	1·41	2·82	—	·21	4·8	·94	2·54	1·38	·87
118·6	—	—	—	12·18	41·4	—	—	—	3·73
85·4	—	2·12	2·82	7·29	53·5	·15	2·54	·72	3·98
290·1	—	—	—	23·49	144·6	—	·22	—	9·57
—	—	—	—	—	—	—	—	—	—
45·9	—	—	—	1·13	6·8	—	—	—	·19
—	—	—	—	—	—	·07	—	—	—
6·4	·71	·71	—	·34	3·2	·15	·07	—	·16
26·8	—	1·41	—	1·78	20·4	—	·80	·29	·98
18·4	—	2·82	—	·86	22·3	·07	4·61	2·17	·99
24·0	—	·71	—	1·14	9·9	·51	·87	·22	·74
21·9	·71	2·82	·71	1·36	4·9	·44	·43	·44	·32
2·8	·71	1·41	·71	·48	1·2	·07	·80	·73	·25
11·3	—	—	·71	·83	8·0	—	·72	·44	·44
79·7	—	9·17	4·23	4·69	15·7	—	1·01	·58	·65
17·6	—	6·35	3·53	2·04	13·9	1·[illegible]9	3·55	2·83	1·10
36·0	—	—	1·41	1·50	26·8	·76	1·30	·55	1·50
145·4	—	4·23	·71	4·50	94·5	·72	2·10	·80	3·88
29·6	—	—	—	3·61	27·1	—	·29	·29	2·73
2·1	—	—	—	·06	3·6	·22	·36	·15	·33
203·3	—	1·41	1·41	14·16	134·2	·07	·07	·07	10·29
13·4	—	—	—	·72	8·7	—	·80	·72	·55
52·9	—	—	—	1·75	23·9	—	·22	·07	1·00
124·9	—	·71	—	4·54	46·8	—	·15	—	1·91
1·4	1·41	—	—	·06	1·7	1·67	—	—	·09
139·0	1·41	·71	1·41	5·62	86·6	1·01	·72	·72	3·47
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	·1	—	—	—	—
·7	—	—	—	·01	·8	—	—	—	·03
—	—	—	—	—	—	—	—	—	—
2098·1	7·76	51·51	20·47	114·38	1324·7	11·31	32·34	11·28	64·97

ABSTRACT No. XVII.—TABLE taken from the REPORT of the PRINCIPAL MEDICAL OFFICER, showing the ADMISSIONS and DEATHS which took place at the CHIEF STATIONS in INDIA during the year 1897.

Districts.	Stations.	Average Annual Strength.	Admitted into Hospital.	Died in and out of Hospital.	Ratio per 1,000 of strength.		Ratio per 1,000 of strength, 1887 to 1896.	
					Admissions.	Deaths.	Admissions.	Deaths.
PRESIDENCY ...	Fort William ...	1,056	1,546	8	1464·0	7·58	1445·0	10·75
	Fort Fulta	20	20	—	1000·0	—	*933·9	—
	Fort Chingrikhal ...	32	15	—	468·8	—	†1357·1	7·94
	Dum Dum	829	868	17	1085·0	20·51	1582·7	17·82
	Barrackpore ...	332	967	19	2912·6	57·23	1997·9	19·91
	Darjeeling	492	443	6	898·4	12·20	1100·4	13·13
ALLAHABAD ...	Allahabad	915	1,396	21	1525·7	22·95	1611·1	22·40
	Fort Allahabad ...	201	425	3	2114·4	14·93	1606·5	17·66
	Dinapore	785	1,232	16	1569·4	20·38	1694·9	17·00
	Benares	343	721	13	2102·0	37·90	1759·8	24·46
OUDH	Lucknow	2,479	3,255	45	1313·0	18·15	1351·3	20·75
	" Military Prison	36	31	1	861·1	27·78	1316·9	8·99
	Fyzabad	773	1,039	10	1344·1	12·94	1505·1	13·55
	Sitapur	407	684	47	1680·6	115·48	1354·9	11·50
	Futehgarh	196	337	5	1719·4	25·51	1351·5	16·83
	Cawnpore	698	1,221	11	1749·3	15·76	1529·2	22·47
ROHILKHAND ...	Bareilly	1,091	1,864	12	1708·5	11·00	1355·6	16·50
	Shahjahanpur ...	425	738	3	1736·5	7·06	1684·2	12·97
	Ranikhet	807	1,250	9	1548·9	11·15	1275·7	13·62
	Chaubuttia	273	297	1	1087·9	3·66	1335·7	11·39
	Naini Tal	123	139	6	1130·1	48·78	1463·8	23·20
NARBUDDA ...	Jubbulpore ...	739	1,737	14	2352·7	19·20	1569·1	18·74
	Saugor	276	479	6	1735·5	21·74	1959·0	10·95
	Pachmarhi	83	124	—	1494·0	—	1673·9	23·43

* 8 years (1889-96). † 6 years (1891-96).

Districts.	Stations.	Average Annual Strength.	Admitted into Hospital.	Died in and out of Hospital.	Ratio per 1,000 of Strength.		Ratio per 1,000 of Strength, 1887 to 1896.	
					Admissions.	Deaths.	Admissions.	Deaths.
BUNDELKHAND	Agra	1,088	1,974	63	1814·3	57·90	1489·7	18·02
	Nowgong	416	1,224	7	2942·3	16·83	2069·6	12·17
	Jhansi	769	1,530	34	1989·6	44·21	2037·0	22·02
MEERUT ...	Meerut	2,045	3,013	50	1473·3	24·45	1614·2	17·61
	Muttra	540	1,088	17	2014·8	31·48	1571·4	14·52
	Delhi	295	642	8	2176·3	27·12	2304·1	21·45
	Roorkee	379	393	1	1036·9	2·64	1297·1	18·57
	Chakrata	749	1,296	7	1729·0	9·[illegible]	1199·2	12·34
	Landour	123	164	3	1333·3	24·39	1385·4	22·32
SIRHIND ...	Umballa	2,154	3,059	49	1420·1	22·75	1217·6	13·20
	Dagshai	558	597	8	1069·9	14·34	1114·4	12·66
	Solon	139	213	3	1532·4	21·58	929·1	9·79
	Subathu	425	455	6	1070·6	14·12	1242·0	16·35
	Jutogh	222	252	5	1135·1	22·52	1154·0	11·75
	Kasauli	344	574	10	1668·6	29·07	1379·9	15·84
LAHORE	Mian Mir	828	1,275	21	1539·9	25·36	2287·8	26·53
	Jullundur	675	988	8	1463·7	11·85	1398·2	13·79
	Ferozepore	991	2,146	9	2165·5	9·08	1757·8	15·89
	Fort Lahore	102	206	3	2019·6	29·41	2735·1	43·62
	Amritsar	215	402	5	1869·8	23·26	2257·0	18·74
	Multan	1,043	1,656	6	1587·7	5·75	1589·9	13·17
	Dalhousie	598	752	3	1257·5	5·02	1472·9	14·87
RAWAL PINDI ...	Rawal Pindi	2,953	3,962	53	1341·7	17·95	1435·4	17·80
	Sialkot	966	1,070	15	1107·7	15·53	1484·0	12·72
	Campbellpore	236	351	5	1487·3	21·19	1575·3	12·41
	Fort Attock	155	209	4	1348·4	25·81	2170·7	25·48
	Khyra Gali	33	37	—	1121·2	—	995·1	4·89
	Bara Gali	25	25	—	1000·0	—	*1122·0	9·57
	Kuldana	263	215	1	817·5	3·80	1140·1	6·47
	Kalabagh	41	27	1	658·5	24·39	1149·8	9·73
	Camp Gharial	287	268	1	933·8	3·48	925·3	12·23
	„ Thobba	197	255	—	1294·4	—	1250·3	8·24
	„ Topa	58	119	3	2051·7	51·72	1028·3	9·00
	„ Ghora Dhaka	79	66	—	835·4	—	†742·1	5·29
	Muree	88	63	6	715·9	68·18	1319·4	43·41

* 9 years (1887-90, and 1892-96). † 6 years (1889-90, 1892 and 1894-96).

Districts.	Stations.	Average Annual Strength.	Admitted into Hospital.	Died in and out of Hospital.	Ratio per 1,000 of Strength.		Ratio per 1,000 of Strength, 1887 to 1896.	
					Admissions.	Deaths.	Admissions.	Deaths.
Peshawar ...	Peshawar	1,968	3,383	91	1719·0	46·24	1767·7	24·84
	Nowshera	502	938	10	1868·0	19·92	1644·3	16·96
	Cherat	383	611	30	1595·3	78·33	1067·5	17·72
Madras	Madras	545	944	4	1732·1	7·34	1483·4	15·44
	St. Thomas Mt. ...	317	410	10	1293·4	31·55	1368·6	12·31
	Pallaverum	64	98	1	1531·3	15·63	1135·3	8·46
	Poonamallee ...	179	259	3	1446·9	16·76	2015·4	41·43
Southern District	Wellington .. .	1,022	972	9	951·1	8·81	1179·6	6·56
	Cannanore	86	107	1	1244·2	11·63	1329·0	12·87
	Calicut	102	92	2	902·0	19·61	1230·2	13·33
	Malapuram	155	199	1	1283·9	6·45	1316·5	16·87
Bangalore ...	Bangalore	1,667	2,092	25	1254·9	15 00	1076·6	8·26
Belgaum ...	Belgaum	883	1,119	7	1267·3	7 93	1043·9	5·18
	Bellary	583	881	8	1511·1	13·72	1410·9	8·77
	Ramandroog... ...	33	25	—	757·6	—	*975·8	—
Secunderabad ...	Secunderabad ...	2,622	3,556	47	1356·2	17·93	1177·0	12·41
Rangoon ...	Rangoon	1,060	1,668	13	1573·6	12·26	1399·5	13·99
	Port Blair	141	104	1	737·6	7·09	1043·6	8·44
	Thayetmyo	551	811	5	1471·9	9·07	1480·4	9·85
	Meiktila	389	476	3	1223·6	7·71	1576·4	10·23
Mandalay ...	Mandalay	1,004	1,768	14	1761·0	13·94	†1722·7	17·56
	Shwebo	459	678	4	1477·1	8·71	†1596·6	9·27
	Bhamo	275	317	3	1152·7	10·91	†2239·9	20·79
	Bernardmyo... ...	180	132	1	733·3	5·56	†1104·9	13·77
Poona	Poona	1,985	2,392	15	1205·0	7·56	1210·3	11·32
	Ahmednagar ...	566	769	12	1358·7	21·20	1260·0	12·56
	Kirkee	730	1,032	11	1413·7	15·07	1174·9	11·45
	Satara	154	220	2	1428·6	12·99	1429·5	4·90
	Purandhur	102	116	—	1137·3	—	1502·4	11·35
Mhow	Mhow	1,652	2,678	38	1621·1	23·00	1476·2	12·82
	Nasirabad	698	1,218	19	1745·0	27·22	1562·5	19·27
	Neemuch	319	818	5	2564·3	15·67	1772·3	24·55
	Indore	89	120	2	1348·3	22·47	1728·9	20·43
	Taragarh	43	64	—	1488·4	—	1734·8	35·91

* 7 years (1890–95).

† 9 years (1888–96).

Districts.	Stations.	Average Annual Strength.	Admitted into Hospital.	Died in and out of Hospital.	Ratio per 1,000 of Strength.		Ratio per 1,000 of Strength, 1887 to 1896.	
					Admissions.	Deaths.	Admissions.	Deaths.
BOMBAY ...	Bombay (Colaba) ...	1,128	1,299	13	1151·6	11·52	1258·4	10·88
	Deolali	866	1,497	16	1728·6	18·48	1636·5	13·27
	Khandalla	66	73	—	1106·1	—	1223·8	7·85
DEESA	Deesa	339	685	12	2020·6	35·40	1374·3	8·10
	Ahmedabad	240	715	6	2979·2	25·00	2383·6	23·79
	Mt. Abu	73	109	4	1493·2	54·79	1994·5	12·31
ADEN	Aden	1,068	1,400	7	1310·9	6·55	1562·0	13·45
SIND	Karachi	1,099	2,216	11	2016·4	10·01	1801·9	11·45
	Hyderabad	371	685	4	1846·4	10·78	1618·6	8·62
NAGPUR ...	Kamptee	866	1,521	10	1756·3	11·55	1391·3	11·11
	Sitabaldi	52	95	—	1826·9	—	1732·6	13·18
QUETTA	Quetta	2,307	2,651	24	1149·1	10·40	1496·9	12·76
MARCHING ...	Troops on the march	1,068	1,429	22	1338·0	20·60	907·7	13·14

ABSTRACT No. XVIII.—TABLE, taken from the REPORT of the PRINCIPAL MEDICAL OFFICER, showing the STATIONS in INDIA at which the ADMISSIONS and DEATHS from ENTERIC FEVER took place in each of the four quarters of the year 1897.

Districts.	Stations.	1st Quarter		2nd Quarter		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Presidency	Fort Chingrikhal	—	—	1		—	—	—	—	1	—
	Dum-Dum ..	—	—	—		1	—		—	1	—
	Barrackpore ..	7	1	7		9	—		—	23	1
	Darjeeling ..	2	—	2		—	—		—	4	—
Allahabad	Allahabad ..	24	8	6	4	3	1	8	1	41	14
	Fort Allahabad	2	—	4	1	—	—	3	1	9	2
	Dinapore ..	3	1	1		3	—		1	7	2
	Benares ..	1	1	23	6	14	2	4		42	9
Oudh ..	Lucknow ..	21	6	32	11	5	2	62	11	20	30
	„ Military Prison ..	—	—	2		—	—			2	—
	Fyzabad ..	2	1	2	—	3	1	2	—	9	2
	Sitapur	—	—	4	4	1	—		1	5	5
	Fatehgarh ..		—	2	1	1	1	2	1	5	3
	Cawnpore ..	1	—	5	—	3	2	3	1	12	3
Rohilkhand	Bareilly ..	3	—	6	5	2	—	5	1	16	6
	Shahjahanpur ..	—	—	1	1	1	1			2	2
	Ranikhet ..	6	—	7	2	6	1		—	19	3
	Chaubuttia ..	—	—	1	1	—	—	—		1	1
	Naini Tal ..	—	—	4	1	—	—		—	4	1
Narbudda	Jubbulpore ..	10	2	6	1	6	2	1	—	23	5
	Saugor	—	1	2	1	—	1	—		2	3
	Pachmarhi ..	1	—	—		—	—	—	—	1	—

District.	Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Bundelkhand	Agra	2	2	84	19	76	21	19	7	181	49
	Nowgong ..	1	1	—	—	—	—	—	—	1	1
	Jhansi	8	3	6	4	10	1	39	9	63	17
Meerut ..	Meerut	21	5	36	19	27	7	18	7	97	38
	Muttra	—	—	7	3	6	1	3	1	16	5
	Delhi	—	—	1	—	2	—	—	1	3	1
	Roorkee.. ..	—	—	1	—	—	—	—	—	1	—
	Chakrata ..	6	—	42	6	6	—	—	—	54	6
	Landour ..	—	—	3	—	1	—	—	—	4	—
Sirhind ..	Umballa ..	17	5	30	9	19	5	72	14	138	33
	Dagshai ..	2	—	58	4	16	3	—	—	76	7
	Solon	—	—	8	—	2	1	—	—	10	1
	Subathu ..	1	—	19	3	13	3	—	—	33	6
	Jutogh	4	—	6	2	4	1	—	—	14	3
	Kasauli	8	—	6	4	—	1	1	—	10	5
Lahore ..	Mian Mir ..	4	2	7	—	1	1	2	1	14	4
	Jullundur ..	2	—	9	3	1	1	2	1	14	5
	Ferozepore ..	1	—	4	—	1	—	6	1	12	1
	Fort Lahore ..	1	—	4	2	—	—	1	—	6	2
	Amritsar ..	1	—	—	—	10	2	2	—	13	2
	Multan	—	—	—	—	—	—	2	1	2	1
	Dalhousie ..	—	—	10	1	—	—	—	—	10	1
Rawal Pindi	Rawal Pindi ..	9	1	36	6	30	10	20	6	95	23
	Sialkot	1	1	10	7	—	1	4	—	15	9
	Campbellpore ..	—	—	21	5	—	—	—	—	21	5
	Fort Attock ..	—	—	4	1	1	—	—	—	5	1
	Khyra Gali ..	—	—	1	—	—	—	—	—	1	—
	Bara Gali ..	—	—	1	—	—	—	—	—	1	—

Districts.	Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Rawal Pindi —*cont.*	Camp Gharial ..	—	—	8	—	—	—	—	—	8	—
	„ Thobba ..	—	—	1	—	—	—	—	—	1	—
	„ Topa ..	—	—	—	—	1	—	—	—	1	—
	Murree	—	—	2	—	—	—	—	—	2	—
Peshawar ..	Peshawar ..	20	5	11	5	13	6	43	37	87	53
	Nowshera ..	1	—	9	3	1	—	1	1	12	4
	Cherat	—	—	17	2	62	18	1	1	80	21
Madras ..	Madras	1	1	2	—	1	—	1	—	5	1
	St. Thomas Mt.	1	1	1	1	1	1	1	—	4	3
	Pallaveram ..	1	—	—	—	—	—	—	—	1	—
	Poonamallee ..	—	—	—	—	—	—	1	1	1	1
Southern District	Wellington ..	—	—	10	2	2	1	—	—	12	3
	Cannanore ..	1	1	—	—	—	—	—	—	1	1
	Calicut	—	—	1	—	4	2	—	—	5	2
	Malapuram ..	2	—	3	—	—	1	—	—	5	1
Bangalore ..	Bangalore ..	31	4	13	2	15	5	8	1	67	12
Belgaum ..	Belgaum ..	—	—	1	—	2	1	1	—	4	1
	Bellary	—	—	—	—	6	2	2	—	8	2
	Ramandroog ..	—	—	—	—	—	—	—	—	—	—
Secunderabad	Secunderabad ..	33	8	4	2	31	8	27	5	95	23
Rangoon ..	Rangoon ..	3	—	6	2	12	4	3	1	24	7
	Port Blair ..	1	1	—	—	—	—	—	—	1	1
Mandalay ..	Mandalay ..	1	1	1	—	—	1	—	—	2	2
	Shwebo	1	1	—	—	—	—	—	—	1	1
Poona ..	Poona	6	1	4	1	23	2	3	1	36	5
	Ahmednagar ..	8	3	11	5	7	2	4	1	30	11
	Kirkee	3	1	1	—	11	3	—	1	15	5
Mhow ..	Mhow	10	5	30	10	35	12	6	1	81	28

Districts.	Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Mhow—*cont.*	Nasirabad	4	—	10	6	11	4	—	2	25	12
	Neemuch	—	—	3	2	1	—	3	1	7	3
	Indore	—	—	—	—	1	1	—	—	1	1
Bombay	Bombay (Colaba)	—	—	1	1	2	—	1	—	4	1
	Deolali	6	1	—	—	3	—	6	1	15	2
Deesa	Deesa	6	2	6	3	1	—	2	2	15	7
	Ahmedabad	1	—	—	1	1	—	—	—	2	1
Sind	Karachi	—	—	5	1	3	3	1	—	9	4
	Hyderabad	—	—	—	—	—	—	1	1	1	1
Nagpur	Kamptee	1	—	6	2	2	1	1	1	10	4
Quetta	Quetta	1	—	5	—	28	9	18	2	52	11
Marching	Troops on the march	4	—	1	—	4	—	52	3	61	3
	Total	314	77	705	188	568	160	463	131	2050	556

ABSTRACT No. XIX.—TABLE, taken from the REPORT of the PRINCIPAL MEDICAL OFFICER, showing the STATIONS in INDIA at which the ADMISSIONS and DEATHS from CHOLERA took place in each of the four quarters of the year 1897.

Districts.	Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Presidency ..	Fort William	—	—	2	2	—	—	—	—	2	2
Allahabad	Allahabad ..	—	—	1	1	—	—	—	—	1	1
	Fort Allahabad	—	—	—		3	1	—	—	3	1
Oudh ..	Lucknow ..	—	—	—	—	—	—	1	1	1	1
	Fyzabad ..	—	—	1	1	—	—	—	—	1	1
	Sitapur ..	—	—	—	—	65	40	—	—	65	40
	Cawnpore ..	—	—	—	—	1	1	—	—	1	1
Bundelkhand	Agra	—	—	—	—	1	1	—	—	1	1
	Jhansi ..	—	—	—	—	4	4	—	—	4	4
Meerut	Muttra ..	—	—	7	6	—	—	2	2	9	8
	Delhi	—	—	—	—	1	1	—	—	1	1
Sirhind ..	Umballa ..	—	—	—	—	2	1	—	—	2	1
Lahore ..	Mian Mir ..	—	—	—	—	1	—	—	—	1	—
Belgaum	Belgaum ..	—	—	3	2	—	—	—	—	3	2
	Bellary ..	—	—	—	—	—	—	1	—	1	—
Secunderabad..	Secunderabad	—	—	1	1	3	1	—	—	4	2
Poona ..	Poona.. ..	—	—	—	—	1	—	—	—	1	—
	Kirkee ..	—	—	1	—	—	—	—	—	1	—
Mhow	Nasirabad ..	—	—	—	—	4	3	—	—	4	3
Bombay ..	Deolali ..	—	—	3	3	—	—	—	—	3	3
Sind	Hyderabad ..	—	—	—	—	1	1	—	—	1	1
Nagpur ..	Kamptee ..	—	—	—	—	1	1	—	—	1	1
Marching ..	Marching ..	1	1	—	1	4	4	—	—	5	6
	Total ..	1	1	19	17	92	59	4	3	116	80

the DIFFERENT CLASSES OF DISEASES in each of the MILITARY DISTRICTS concluded.

Bombay.		Deesa.		Aden.		Sind.		Nagpur.		Quetta.		Marching.		Total.	
2 060		652		1,068		1,470		918		2,307		1,068		64,531	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1	—	3	—	1	—	—	—	—	—	—	—	1	—	24	4
—	—	—	—	—	—	—	—	—	—	4	—	—	—	74	—
3	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	272	1
—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1
19	3	17	8	—	—	10	5	10	4	52	11	61	3	2,050	556
81	1	23	—	145	—	—	—	92	—	4	—	7	—	2,750	1
3	3	—	—	—	—	1	1	1	1	—	—	5	6	116	80
60	—	13	—	30	—	44	—	9	—	48	3	70	2	2,215	62
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
648	—	488	2	275	1	1,495	—	332	—	332	2	658	1	23,496	44
2	1	1	—	1	1	1	—	—	—	12	—	2	—	122	9
39	3	2	1	6	—	4	—	1	—	8	1	2	—	330	40.
150	—	38	—	114	—	79	—	44	—	159	—	55	—	8 108	1
265	2	80	—	88	2	71	—	69	—	177	—	26	—	6,853	22
292	—	157	—	160	—	206	—	275	—	318	—	132	—	12,307	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
21	—	5	—	16	—	50	—	5	—	8	—	5	—	707	—
—	—	—	—	—	—	1	—	—	—	—	—	1	—	23	—
3	—	7	—	3	—	10	—	12	—	17	—	1	1	336	2
83	—	15	—	62	—	49	—	22	—	100	—	18	—	1,920	1
79	—	40	—	28	—	20	—	12	—	33	—	35	—	1,194	1
8	1	2	—	1	—	7	1	6	—	15	1	1	—	372	8
28	1	6	1	3	1	10	1	4	1	8	1	1	—	428	26
12	1	3	—	—	—	3	—	—	—	7	—	—	—	111	1
28	—	9	—	19	—	21	—	13	—	19	—	2	—	727	—
28	—	11	—	15	—	63	—	27	—	39	—	5	—	960	—
86	2	9	1	6	—	27	2	1	—	34	—	11	—	728	38
52	2	35	—	10	—	28	—	16	—	63	1	22	1	1,616	38
227	5	109	4	75	1	175	1	82	1	300	2	97	—	7.807	116
53	—	32	—	20	—	40	—	65	1	15	—	19	—	2,057	3
6	1	—	—	3	—	5	—	—	—	5	1	—	—	126	13
249	—	172	—	119	—	97	—	279	—	427	—	73	—	6 435	1
31	—	10	—	4	—	17	—	8	—	24	—	4	—	760	3
35	—	16	—	21	—	26	—	27	—	30	—	13	—	1,412	—
93	—	92	—	66	—	154	—	85	—	73	—	20	—	3,423	—
6	2	18	3	6	—	7	2	5	2	1	1	22	4	277	78
178	1	94	2	101	1	169	2	113	—	264	—	60	1	6,466	38
—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2
—	—	—	—	1	—	—	—	1	—	—	—	—	1	51	2
—	—	—	—	1	—	11	—	—	—	10	—	—	—	159	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2,869	29	1,509	22	1,400	7	2,901	15	1,616	10	2,651	24	1,429	22	96,824	1,214

ABSTRACT No. XXI.—Table, taken from the Report of the Principal Medical Officer, showing the Prevalence and Mortality in the Cantonments of India, due to Dysentery, Diarrhœa, and Hepatic Diseases (Congestion, Inflammation, and Abscess of the Liver) in each Quarter of the Year 1897.

—		Dysentery.				Diarrhœa.				Hepatic Diseases.				Total.			
		Number.		Ratio per 1,000 of Strenght.		Number.		Ratio per 1,000 of Strengh.		Number.		Ratio per 1,000 of Strength.		Number.		Ratio per 1,000 of Strength.	
	Strength.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1st Quarter ..	70,110	399	7	5·7	·10	260	1	3·7	·01	317	16	4·5	·23	976	24	13·9	·34
2nd " ..	70,112	477	15	6·8	·21	371	—	5·3	—	379	19	5·4	·27	1,227	34	17·5	·48
3rd " ..	62,675	629	20	10·0	·32	558	—	8·9	—	333	29	5·3	·46	1,520	49	24·3	·78
4th " ..	55,226	710	40	12·9	·72	472	2	8·5	·04	295	25	5·3	·45	1,477	67	26·7	1·21
Total ..	64,531	2,215	82	34·3	1·27	1,661	3	25·7	·05	1,324	89	20·5	1·38	5,200	174	80·6	2·70

ABSTRACTS XXII to XXVII.

ABSTRACT No. XXII.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS
the TROOPS stationed at EGYPT and CYPRUS during the Year 1897, with

Average Strength, 4,449.		Deaths.			Invalids.		
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.	Average Number constantly Sick.
GENERAL DISEASES.							
Small-pox	3	1	—	1	—	—	·27
Other Eruptive Fevers	3	—	—	—	—	—	·19
Influenza	—	—	—	—	—	—	—
Diphtheria	6	—	—	—	—	—	·43
Enteric Fever	30	8	—	8	—	—	8·87
Other Continued Fevers	523	—	—	—	—	—	21·16
Cholera	—	—	—	—	—	—	—
Dysentery	66	2	—	2	3	—	5·11
Yellow Fever	—	—	—	—	—	—	—
Malarial Fevers	38	—	—	—	—	—	1·24
Septic Diseases	4	—	—	—	—	—	·49
Tubercular Diseases	12	—	1	1	10	8	4·77
Syphilis, Primary	124	—	—	—	—	—	14·73
,, Secondary	230	1	—	1	5	3	28·74
Gonorrhœa	363	—	—	—	—	—	28·46
Hydrophobia	—	—	—	—	—	—	—
Parasitic Diseases	27	—	—	—	—	—	·88
Scurvy	—	—	—	—	—	—	—
Alcoholism	10	—	—	—	—	—	·48
Rheumatism	84	—	—	—	1	1	7·74
Debility	13	—	—	—	3	—	1·47
Other General Diseases	16	1	—	1	—	—	1·44
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous	15	2	—	2	2	2	1·06
Nervous System { Mental	2	—	—	—	3	1	1·15
Eye	95	—	—	—	1	1	5·25
Other Organs of Special Sense	57	—	—	—	3	2	3·68
Circulatory System	22	2	—	2	8	5	3·08
Respiratory ,,	90	5	—	5	2	1	7·14
Digestive ,,	313	4	—	4	4	2	13·18
Lymphatic ,,	62	—	—	—	—	—	7·82
Urinary ,,	3	—	—	—	—	—	·45
Generative ,,	422	—	—	—	—	—	37·22
Organs of Locomotion	45	—	—	—	2	1	2·25
Connective Tissue	73	—	—	—	1	1	3·75
Skin	174	—	—	—	—	1	10·21
INJURIES.							
General	8	4	—	4	3	2	1·11
Local	288	5	—	5	4	3	17·98
In Action	—	—	—	—	—	—	—
POISONS	3	1	—	1	—	—	·20
No appreciable disease	13	—	—	—	—	—	·22
Cause unknown (refers to deaths only)	—	—	—	—	—	—	—
General Total	3242	36	1	37	55	34	242·96

into HOSPITAL, DEATHS, NUMBERS INVALIDED and CONSTANTLY SICK among the Ratios per 1,000 of the Strength, and the Average Ratios for 10 Years.

Ratio per 1,000.					Average Ratio per 1,000 from 1887 to 1896.				
Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.	Admissions.	Deaths.	Invalids sent Home.	Invalids finally Discharged.	Constantly Sick.
·7	·22	—	—	·06	2·1	·31	—	—	·28
·7	—	—	—	·04	2·1	—	—	—	·65
—	—	—	—	--	5·0	—	—	—	·14
1·3	—	—	—	·10	—	—	—	—	—
6·7	1·80	—	—	1·99	23·6	4·91	2·06	·07	4·16
119·8	—	—	—	4·76	104·5	·07	·42	·02	3·75
—	—	—	—	—	·1	·13	—	—	—
14·8	·45	·67	—	1·15	22·6	·77	·55	·16	1·65
—	—	—	—	—	—	—	—	—	—
7·4	—	—	—	·28	24·1	·05	·04	·04	·96
·9	—	—	—	·11	·8	·05	·02	—	·04
2·7	·22	2·25	1·80	1·07	2·9	·69	1·50	1·04	·81
27·9	—	—	—	3·31	55·3	—	·04	—	4·88
51·7	·22	1·12	·67	6·46	44·2	—	·88	·40	4·24
81·6	—	—	—	6·40	109·4	—	·09	·04	7·56
—	—	—	—	—	—	—	—	—	—
6·1	—	—	—	·20	9·0	—	—	—	·29
—	—	—	—	—	—	—	·02	—	·01
2·2	—	—	—	·11	3·9	·13	·04	—	·16
18·9	—	·22	·22	1·74	24·2	·11	·51	·18	1·66
2·9	—	·67	—	·33	16·6	—	2·30	1·18	1·52
8·6	·22	—	—	·32	10·0	·05	·18	·04	·60
3·4	·45	·45	·45	·24	7·6	·35	1·06	1·04	·53
·4	—	·67	·22	·26	1·6	·04	1·44	1·50	·42
21·4	—	·22	·22	1·19	34·2	—	·58	·53	1·76
12·8	—	·67	·45	·83	14·1	·02	·38	·10	·83
6·0	·45	1·80	1·12	·69	9·3	·35	2·41	2·65	1·10
20·2	1·12	·45	·22	1·61	35·5	·66	·69	·49	2·36
70·4	·90	·90	·45	2·96	124·6	1·11	1·46	·75	4·94
13·9	—	—	—	1·76	21·2	—	·31	·11	2·62
·7	—	—	—	·10	1·6	·04	·18	·11	·19
91·9	—	—	—	8·37	112·0	—	·27	·22	8·14
10·1	—	·45	·22	·66	8·8	·02	·55	·53	·71
16·4	—	·22	·22	·84	26·2	—	·16	—	1·41
39·1	—	—	·22	2·29	46·7	—	·07	·02	2·38
1·8	·90	·67	·45	·25	·9	·71	·09	·04	·10
64·7	1·12	·90	·67	4·04	89·8	·40	·77	·53	4·42
—	—	—	—	—	—	—	·02	·05	·02
·7	·22	—	—	·01	1·0	·11	—	—	·03
2·9	—	—	—	·05	8·2		—	—	·12
—	—	—	—	—	—	—	—	—	—
728·7	8·31	12·36	7·64	54·61	998·8	11·08	19·04	12·09	65·48

ABSTRACT No. XXIII.—Table showing the Average Strength, Ship proceeding on and returning from Service Abroad, and from one during the Year 1897.

Strength of W.O., N.C.O., and Men:	Passage Out.		Passage Home.	
Embarked	20,042		13,609	
Average Annual Strength...	995		799	
	Admitted.	Died.	Admitted.	Died.
GENERAL DISEASES.				
Small-pox	—	—	2	1
Other Eruptive Fevers	3	—	—	—
Influenza	18	—	—	—
Diphtheria	—	—	—	
Enteric Fever...	1	1	1	—
Other Continued Fevers	6	—	7	—
Cholera	—	—	5	4
Dysentery	—	—	5	—
Malarial Fevers	3	—	179	—
Septic Diseases	1	—	1	—
Tubercular Diseases...	—	—	1	—
Syphilis, Primary	96	—	114	—
,, Secondary	52	—	65	—
Gonorrhœa	221	—	152	—
Hydrophobia	—	—	—	—
Parasitic Diseases	29	—	8	—
Scurvy	—	—	—	—
Alcoholism	3	—	1	—
Rheumatism	18	—	16	—
Debility	7	—	6	—
Other General Diseases	22	—	6	—
LOCAL DISEASES.				
Diseases of the—				
Nervous System { Nervous	7	—	3	—
Nervous System { Mental	1	—	—	—
Eye	12	—	7	—
Other Organs of Special Sense	6	—	2	—
Circulatory System	2	1	1	1
Respiratory ,, ...	54	2	52	1
Digestive ,, ...	101	1	62	—
Lymphatic ,, ...	11	—	21	—
Urinary ,, ...	2	—	2	—
Generative ,, ...	106	—	96	—
Organs of Locomotion	4	—	1	—
Connective Tissue	26	—	37	—
Skin	53	—	42	—
INJURIES.				
General	4	—	2	—
Local	86	—	31	—
In Action	—	—	—	—
POISONS	—	—	—	—
Not yet diagnosed	1	—	—	—
No appreciable disease	—	—	—	—
General Total	956	5	928	7

ADMISSIONS into HOSPITAL, and DEATHS among the TROOPS ON BOARD
Colony or Station abroad to another, with the Ratios per 1,000 of the Strength,

Intercolonial.		Ratio per 1,000 of the Strength.					
14,865 529		Passage Out.		Passage Home.		Intercolonial.	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
—	—	—	—	2·5	1·25	—	—
—	—	3·0	—	—	—	—	—
—	—	18·1	—	—	—	—	—
—	—	—	—	—	—	—	—
1	1	1·0	1·01	1·2	—	1·9	1·89
50	—	6·0	—	8·8	—	94·5	—
—	—	—	—	6·3	5·01	—	—
2	—	—	—	6·3	—	3·8	—
22	—	3·0	—	224·0	—	41·6	—
1	—	1·0	—	1·2	—	1·9	—
2	—	—	—	1·2	—	3·8	—
78	—	96·5	—	142·7	—	147·4	—
25	—	52·3	—	81·4	—	47·3	—
126	—	222·1	—	190·2	—	238·2	—
—	—	—	—	—	—	—	—
3	—	29·1	—	10·0	—	5·7	—
—	—	—	—	—	—	—	—
1	—	3·0	—	1·2	—	1·9	—
5	—	18·1	—	20·0	—	9·4	—
1	—	7·0	—	7·5	—	1·9	—
9	—	22·1	—	7·5	—	17·0	—
2	—	7·0	—	3·8	—	3·8	—
—	—	1·0	—	—	—	—	—
7	—	12·1	—	8·8	—	13·2	—
6	—	6·0	—	2·5	—	11·3	—
—	—	2·0	1·1	1·2	1·25	—	—
6	1	54·3	2·1	65·1	1·25	11·3	1·89
24	—	101·5	1·1	77·6	—	45·4	—
19	—	11·0	—	26·3	—	35·9	—
—	—	2·0	—	2·5	—	—	—
62	—	106·5	—	120·2	—	117·2	—
2	—	4·0	—	1·2	—	3·8	—
6	—	26·1	—	46·3	—	11·3	—
30	—	53·3	—	52·6	—	56·7	—
—	—	4·0	—	2·5	—	—	—
44	—	86·4	—	38·8	—	83·2	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	1·0	—	—	—	—	—
—	—	—	—	—	—	—	—
534	2	960·5	5·03	1161·4	8·76	1009·4	3·78

ABSTRACT No. XXIV.—ON THE INFLUENCE OF AGE ON THE MORTALITY.—Table showing the Death Rates of Warrant Officers, Non-commissioned Officers and Men, at the several Ages, arranged by quinquennial periods, in the several Commands Abroad.

Commands.	Under 20 Years.				20 and under 25.				25 and under 30.				30 and under 35.				35 and under 40.				40 and upwards.			
			Ratio per 1,000.				Ratio per 1,000.				Ratio per 1,000.				Ratio per 1,000.				Ratio per 1,000.				Ratio per 1,000.	
	Strength.	Died.	1897.	1887-96.	Strength.	Died.	1897.	1887-96.	Strength.	Died.	1897.	1887-96.	Strength.	Died.	1897.	1887-96.	Strength.	Died.	1897.	1887-96.	Strength.	Died.	1897.	1887-96.
Gibraltar	355	2	5·63	1·89	2,373	5	2·11	3·65	1,548	6	3·88	3·14	313	2	6·39	4·55	110	3	27·27	8·91	27	—	—	16·71
Malta	1,281	10	7·81	6·12	5,131	44	8·57	7·24	2,081	26	12·49	5·90	484	4	8·26	6·29	153	2	13·07	11·95	45	2	44·44	25·61
Egypt and Cyprus	155	—	—	10·72	2,536	17	6·70	11·78	1,342	15	11·18	9·06	276	2	7·25	9·74	110	2	18·18	15·34	30	—	—	16·39
Canada	92	—	—	1·33	847	—	—	2·57	416	—	—	3·71	181	—	—	7·81	40	—	—	15·91	25	—	—	4·61
Bermuda	36	—	—	7·63	910	9	9·89	9·56	429	5	11·65	8·27	92	2	21·74	14·69	43	—	—	6·04	11	—	—	9·90
West Indies	60	—	—	2·26	634	6	9·46	8·66	490	4	8·16	6·75	112	1	8·93	11·10	48	7	145·83	17·96	6	1	166·66	14·28
West Africa	—	—	—	—	9	—	—	—	15	1	66·66	—	5	—	—	—	7	1	142·85	—	2	—	—	—
South Africa and St. Helena ...	488	—	—	4·79	3,746	18	4·80	6·12	2,366	22	9·30	5·06	408	6	14·71	9·13	162	2	12·34	11·43	35	—	—	8·87
Mauritius	29	—	—	12·12	224	1	4·46	10·51	413	3	7·26	17·62	56	1	17·86	16·44	29	—	—	35·32	5	1	200·00	38·46
Ceylon	60	—	—	8·72	700	2	2·86	8·45	414	2	4·83	13·08	108	2	18·52	20·11	40	1	25·00	11·95	2	—	—	—
China	29	1	34·48	3·65	809	3	3·70	9·04	459	5	10·89	10·76	81	1	12·32	17·17	34	—	—	13·65	5	—	—	67·57
Straits Settlements	18	—	—	2·46	704	3	4·26	5·35	484	4	8·26	5·23	102	1	9·80	11·73	37	—	—	13·16	7	—	—	17·86
India	2,029	20	9·86	8·76	33,191	759	22·87	17·20	22,027	337	15·30	13·03	4,419	65	14·71	13·52	1,356	22	16·22	14·78	408	11	26·96	23·28

ABSTRACT No. XXV.—TABLE showing the general HEALTH STATISTICS of the various CORPS which served in the UNITED KINGDOM during the year 1897.

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength. Admitted.	Ratio per 1,000 of Strength. Died.	Ratio per 1,000 of Strength. Invalided.	Ratio per 1,000 of Strength. Average Constantly Sick.	Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
	HOUSEHOLD CAVALRY.										days.	days.		
1st	Life Guards	390	279	1	11	13·43	715·4	2·56	28·21	34·44	12·57	17·58	London, 9 months; Windsor, 3 months	81
2nd	Life Guards	389	218	2	5	14·84	560·4	5·14	12·85	38·15	13·92	24·84	London, 12 months	81
	Royal Horse Guards	388	196	—	8	18·22	505·2	—	20·62	34·07	12·44	24·62	London, 3 months; Windsor, 9 months...	81
	Household Cavalry detached	12	—	—	1	1·42	—	—	83·33	118·33	43·19	—		
	Total Household Cavalry	1,179	693	3	25	42·91	587·8	2·54	21·20	36·39	13·38	22·60		
	CAVALRY.													
1st	Dragoon Guards	411	335	3	11	20·91	815·1	7·30	26·76	50·88	18·57	22·78	Colchester, 12 months	6
2nd	Dragoon Guards	382	330	—	5	18·82	863·9	—	13·09	49·27	17·98	20·81	Shorncliffe, 6 months; Leeds, 6 months	1
3rd	Dragoon Guards	411	391	6	9	24·31	951·3	14·60	21·90	59·15	21·59	22·69	Woolwich, 6 months; York, 6 months ...	2
6th	Dragoon Guards	642	436	—	11	25·59	679·1	—	17·13	39·86	14·55	21·42	Aldershot, 12 months	9
7th	Dragoon Guards	353	261	3	5	11·96	739·4	8·50	14·16	33·88	12·37	16·72	Norwich, 12 months	3
1st	Royal Dragoons	657	368	5	5	19·41	560·1	7·61	7·61	29·54	10·78	19·25	Belfast and Dundalk, 6 months; Hounslow, 4 months: Aldershot, 2 months.	41
2nd	Royal Dragoons	537	391	2	20	26·66	728·1	3·72	37·24	49·65	18·12	24·88	Hounslow, 6 months; Piershill and Maryhill, 5 months; Bulford Camp, 1 month.	41

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	CAVALRY—*cont.*										days.	days.		
3rd	Hussars	634	406	5	17	24·82	640·4	7·89	26·81	39·15	14·29	22·31	Shorncliffe, 4 months; Aldershot, 8 months.	18
6th	Dragoons	391	314	1	11	14·76	803·1	2·56	28·13	37·75	13·78	17·16	Piershill, 6 months; Belfast and Dundalk, 6 months.	7
8th	Hussars	432	293	1	4	15·89	678·2	2·31	9·26	36·78	13·42	19·79	Leeds, 6 months; Cahir, 6 months; Curragh for summer drills.	8
10th	Hussars	657	385	4	14	20·09	586·0	6·09	21·31	30·58	11·16	19·05	Canterbury, 6 months; Curragh, 6 months.	13
12th	Lancers	482	373	—	8	22·63	773·9	—	16·60	46·95	17·14	22·14	Aldershot, 6 months; Ballincollig, 6 months.	10
13th	Hussars	592	523	1	37	41·85	883·7	1·69	62·52	70·71	25·81	29·20	Dublin, 12 months; Curragh for summer drills.	12
14th	Hussars	481	301	1	6	15·49	625·8	2·08	12·47	32·48	11·86	18·78	Cahir, 6 months; Curragh, 6 months ...	11
15th	Hussars	663	240	2	9	14·24	362·0	3·02	13·57	21·48	7·84	21·66	Aldershot, 12 months	16
17th	Lancers	471	261	—	4	14·73	554·1	—	8·49	31·27	11·41	20·60	York, 6 months; Ballincollig, 6 months	7
	Cavalry Depôt	1,179	972	4	47	54·36	824·4	3·39	39·86	46·11	16·83	20·41	Canterbury	—
	Various Regiments	162	135	—	7	17·74	833·3	—	43·21	109·51	39·97	47·96		
	Total Cavalry of the Line ...	9,537	6,715	38	230	404·26	704·1	3·98	24·12	42·39	15·47	21·97		

	ROYAL ARTILLERY.												
Depôt.	Horse Artillery	152	74	—	—	4·15	486·4	—	—	27·30	9·96	20·47	Woolwich, 12 months	Permanent.
D	Horse Artillery	136	91	1	1	5·93	669·1	7·35	7·35	43·60	15·91	23·78	Woolwich, 12 months	8
E	Horse Artillery	155	92	—	2	6·98	593·5	—	12·90	45·03	16·43	27·69	Aldershot, 12 months	8
G	Horse Artillery	154	83	—	5	4·27	539·0	—	32·47	27·73	10·12	18·78	London, 12 months	8
J	Horse Artillery	112	60	—	2	4·89	535·7	—	17·86	43·66	15·93	29·75	Woolwich, 9 months. To India	—
M	Horse Artillery	22	14	—	—	·47	636·4	—	—	21·36	7·80	12·25	Woolwich, 2½ months. From India ...	—
O	Horse Artillery	144	97		6	7·45	673·6	6·94	41·66	51·74	18·88	28·03	Woolwich, 7 months: Aldershot, 5 months.	8
P	Horse Artillery	132	85	1	1	3·05	643·9	7·58	7·58	23·11	8·43	13·10	Ipswich, 12 months	6
Q	Horse Artillery	127	93	—	4	4·73	732·3	—	31·50	37·24	13·39	18·56	Curragh, 12 months	2
R	Horse Artillery	122	112	—	6	6·04	918·0	—	49·18	49·51	18·07	19·68	Curragh, 9 months ; Woolwich, 3 months	5
T	Horse Artillery	145	73	1	2	4·29	503·4	6·90	13·79	29·59	10·80	21·45	Aldershot, 12 months	4
U	Horse Artillery	131	83	—	1	7·31	633·6	—	7·63	55·80	20·37	32·14	Woolwich, 9 months ; Curragh, 3 months.	2
—	Riding Establishment	96	43	—	2	3·99	447·9	—	20·83	41·56	15·17	33·87	Woolwich, 12 months	Permanent.
Depôt.	Field Artillery	377	324	6	8	21·01	859·4	15·91	21·22	55·73	20·34	23·67	Woolwich, 12 months	"
2nd	Field Battery	97	51	—	2	3·80	525·8	—	20·62	30·17	14·30	27·22	Shorncliffe, 12 months	1
4th	Field Battery	101	97	—	3	6·15	960·4	—	29·70	60·89	22·22	23·14	Shorncliffe, 12 months	7
5th	Field Battery	14	7	—	1	·34	500·0	—	71·43	24·29	8·86	17·72	Fermoy, 2 months. From India	—
7th	Field Battery	121	121	1	3	5·10	1000·0	8·26	24·79	42·15	15·38	15·38	Newcastle, 6 months ; Dorchester, 6 months.	9
8th	Field Battery	135	86	—	4	4·14	637·0	—	29·63	30·67	11·19	17·57	Christchurch, 12 months	1
11th	Field Battery	128	56	—	2	2·19	437·5	—	15·63	17·11	6·24	14·27	Limerick, 10 months. To India	—
12th	Field Battery	210	121	—	5	7·68	576·2	—	23·81	36·57	13·35	23·17	Aldershot, 12 months	10
13th	Field Battery	56	32	—	1	1·35	571·4	—	17·86	24·11	8·80	15·40	Dorchester, 4½ months. To South Africa.	—

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	ROYAL ARTILLERY—*cont.*										days.	days.		
14th	Field Battery	121	95		—	4·66	785·1	8·26	—	38·51	14·06	17·90	Newcastle, 12 months	9
17th	Field Battery	13	7	—	1	·33	538·5	—	76·92	25·38	9·26	17·20	Woolwich, 1½ months. From India ...	—
18th	Field Battery	152	95	1	6	4·81	625·0	6·58	39·47	31·84	11·62	18·60	Aldershot, 12 months	10
19th	Field Battery	122	63	—	1	3·63	516·4	—	8·20	29·75	10·86	21·03	Exeter and Okehampton, 12 months ...	4
20th	Field Battery	118	85	1	5	3·11	720·3	8·47	42·37	26·61	9·71	13·48	Ipswich, 12 months	4
25th	Field Battery	100	63	—	—	3·59	578·0	—	—	32·94	12·02	20·80	Fermoy, 10 months. To India	—
28th	Field Battery	109	84	—	2	3·50	770·6	—	18·35	32·11	11·72	15·21	Athlone, 12 months	6
37th	Field Battery	112	55	—	—	2·78	491·1	—	—	24·82	9·06	18·45	Hilsea, 12 months	7
38th	Field Battery	120	79	1	—	3·55	658·3	8·33	—	29·62	10·81	16·40	Aldershot, 12 months	6
39th	Field Battery	109	85	1	3	8·82	779·8	9·17	27·52	80·92	29·53	37·87	Woolwich, 12 months	1
43rd	Field Battery	106	70	—	3	3·24	660·1	—	28·30	30·57	11·16	16·89	Shorncliffe, 12 months	2
44th	Field Battery	115	119	—	3	7·63	1034·8	—	26·09	66·35	24·22	23·10	Colchester, 12 months	1
52nd	Field Battery	114	40	1	3	3·29	350·9	8·77	26·32	28·86	10·53	30·02	Weedon, 10 months. To India	—
56th	Field Battery	155	102	—	2	5·84	658·1	—	12·90	37·68	13·75	20·90	Aldershot, 12 months	10
58th	Field Battery	135	99	—	5	3·92	733·3	—	37·01	29·04	10·60	14·45	Clonmel, 12 months	10
61st	Field Battery	109	51	—	1	3·01	467·9	—	9·17	27·61	10·46	21·54	Hilsea, 12 months	6

62nd	Field Battery	146	117	—	1	5·25	801·4	—	6·85	35·96	13·12	16·38	Aldershot, 12 months	10
63rd	Field Battery	133	103	—	2	6·91	774·4	—	15·04	51·95	18·96	21·49	Bristol and Okehampton, 12 months ...	9
64th	Field Battery	117	117	—	1	6·00	1000·0	—	8·55	51·28	18·72	18·72	Sheffield, 9½ months; Weedon, 2½ months.	9
65th	Field Battery	115	68	1	—	3·59	591·3	8·69	—	31·22	11·39	19·27	Hilsea, 12 months	1
66th	Field Battery	130	119	1	3	5·82	915·4	7·69	23·08	44·77	16·34	17·85	Maryhill, 4 months; Aldershot, 8 months	9
67th	Field Battery	57	52	—	3	5·01	912·3	—	52·63	87·89	32·08	35·16	Woolwich, 4½ months. To South Africa	—
68th	Field Battery	108	113	—	3	8·81	1046·3	—	27·78	81·57	29·77	28·45	Woolwich, 12 months	1
69th	Field Battery	51	26	—	—	1·25	509·8	—	—	24·51	8·95	17·55	Weedon, 5 months. To South Africa ..	—
73rd	Field Battery	114	96	—	1	3·53	842·1	—	8·77	30·96	11·30	13·12	Exeter and Okehampton, 12 months ...	7
74th	Field Battery	125	116	1	2	5·90	928·0	8·00	16·00	47·20	17·23	18·56	Newcastle, 12 months	7
75th	Field Battery	144	103	—	1	6·37	715·3	—	6·94	14·24	16·37	22·57	Colchester, 12 months	10
76th	Field Battery	119	88	1	2	3·10	739·5	8·10	16·81	26·05	9·51	12·85	Athlone, 12 months	4
77th	Field Battery	123	75	—	2	4·01	609·8	—	16·26	32·60	11·90	19·51	Coventry, 12 month	7
78th	Field Battery	113	83	1	—	4·98	734·5	8·85	—	44·07	16·08	21·90	Longford, 8½ months; Woolwich, 3½ months.	6
79th	Field Battery	125	75	—	1	3·46	600·0	—	8·00	27·68	10·10	16·84	Sheffield, 9 months; Dublin, 3 months ...	6
81st	Field Battery	124	67	—	—	2·89	540·3	—	—	23·31	8·51	15·74	Trowbridge, 12 months	2
82nd	Field Battery	116	79	—	—	5·80	681·0	—	—	50·00	18·25	26·80	Woolwich, 12 months	2
83rd	Field Battery	114	85	—	2	7·85	745·6	—	17·51	63·86	25·13	33·71	Woolwich, 12 months	2
84th	Field Battery	125	114	—	3	6·72	912·0	—	24·00	53·76	19·62	21·51	Newcastle, 4 months; Woolwich, 8 months.	2
85th	Field Battery	115	84	1	2	7·82	730·4	8·69	17·39	68·00	21·82	33·93	Woolwich, 12 months	2
86th	Field Battery	115	88	1	1	8·08	765·2	8·69	8·69	70·26	25·64	33·30	Woolwich, 12 months	2
87th	Field Battery	128	70	—	2	6·17	546·9	—	15·62	48·20	17·59	32·17	Woolwich, 12 months	2

ABSTRACT No. XXI.—TABLE, taken from the REPORT of the PRINCIPAL MEDICAL OFFICER, showing the PREVALENCE and MORTALITY in the Cantonments of INDIA, due to DYSENTERY, DIARRHŒA, and HEPATIC DISEASES (Congestion, Inflammation, and Abscess of the Liver) in each Quarter of the Year 1897.

—	Strength.	Dysentery.				Diarrhœa.				Hepatic Diseases.				Total.			
		Number.		Ratio per 1,000 of Strenght.		Number.		Ratio per 1,000 of Strengh.		Number.		Ratio per 1,000 of Strength.		Number.		Ratio per 1,000 of Strength.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1st Quarter ..	70,110	399	7	5·7	·10	260	1	3·7	·01	317	16	4·5	·23	976	24	13·9	·34
2nd " ..	70,112	477	15	6·8	·21	371	—	5·3	—	379	19	5·4	·27	1,227	34	17·5	·48
3rd " ..	62,675	629	20	10·0	·32	558	—	8·9	—	333	29	5·3	·46	1,520	49	24·3	·78
4th " ..	55,226	710	40	12·9	·72	472	2	8·5	·04	295	25	5·3	·45	1,477	67	26·7	1·21
Total ..	64,531	2,215	82	34·3	1·27	1,661	3	25·7	·05	1,324	89	20·5	1·38	5,200	174	80·6	2·70

2nd	Grenadier Guards...	685	616	2	14	43·46	899·3	2·92	20·44	63·44	23·16	25·58	London, 8 months; Windsor, 4 months...	6
3rd	Grenadier Guards...	764	591	2	22	42·84	773·6	2·62	28·80	56·07	20·46	26·55	London, 12 months	12
1st	Coldstream Guards	749	385	3	19	35·08	514·0	4·00	25·37	46·84	17·10	24·91	London, 12 months	12
2nd	Coldstream Guards	786	411	3	13	36·52	523·0	3·82	16·54	46·46	16·96	32·43	London, 4 months; Windsor, 8 months...	15
3rd	Coldstream Guards	24	22	—	—	·46	916·7	—	—	19·17	7·00	7·63	Woolwich, 1 month	—
1st	Scots Guards	760	566	6	18	41·01	744·7	7·89	23·68	53·96	19·69	26·44	London, 12 months	15
2nd	Scots Guards	743	505	2	21	35·07	679·7	2·69	28·26	47·20	17·23	25·35	London, 8 months; Dublin, 4 months ...	12
	Detachments	122	96	—	5	67·82	786·9	—	40·98	555·90	200·75	257·86		
	Total Foot Guards	5,239	3,572	22	127	330·22	681·8	4·20	24·18	63·03	23·01	33·74		
	INFANTRY.													
1st	Royal Scots	702	402	—	10	25·70	572·6	—	14·25	36·62	13·37	23·33	Edinburgh Castle, 12 months	6
2nd	Royal West Surrey Regiment	535	490	—	23	28·24	915·9	—	42·99	52·78	19·26	21·03	Aldershot, 12 months	3
2nd	East Kent Regiment	581	337	1	12	19·04	580·0	1·72	20·65	32·77	11·96	20·62	Kilkenny, 12 months	11
2nd	Royal Lancaster Regiment	614	654	—	13	42·02	1065·1	—	21·17	68·44	24·98	23·45	Manchester, 6 months; Devonport, 6 months.	1
2nd	Northumberland Fusiliers ...	525	375	2	2	20·23	714·3	3·81	3·81	38·53	14·06	19·69	Portland, 12 months...	1
2nd	Royal Warwickshire Regiment... ...	615	607	—	15	34·45	987·0	—	24·39	56·02	20·44	20·71	Chatham, 12 months; Detachment at Gravesend.	1
2nd	Royal Fusiliers	659	438	3	28	32·10	664·6	4·55	42·49	48·71	17·78	26·75	Belfast and Holywood, 6½ months; Curragh, 5½ months.	8
2nd	(King's) Liverpool Regiment	630	876	2	41	53·33	1390·5	3·17	65·08	84·65	30·90	22·22	Colchester, 7 months; Aldershot, 2 months; Holywood, 3 months.	5
2nd	Norfolk Regiment...	567	169	3	4	8·89	298·1	5·29	7·05	15·68	5·72	19·20	Kinsale, 12 monhts	7
2nd	Lincolnshire Regiment	630	383	4	23	28·52	607·9	6·35	36·51	45·27	16·52	27·25	Woolwich, 6 months; Aldershot, 2¼ months; Sheffield, 3¾ months.	2
2nd	Devonshire Regiment	678	347	1	11	20·21	511·8	1·47	16·22	29·81	10·88	21·26	Pembroke Dock, 7 months; Aldershot, 5 months.	4

ABSTRACT No. XXII.—TABLE showing the AVERAGE STRENGTH, ADMISSIONS the TROOPS stationed at EGYPT and CYPRUS during the Year 1897, with

Average Strength, 4,449.		Deaths.			Invalids.		
Diseases.	Admissions into Hospital.	In the Command.	Of Invalids.	Total.	Number sent Home.	Number finally Discharged the Service.	Average Number constantly Sick.
GENERAL DISEASES.							
Small-pox ...	3	1	—	1	—	—	·27
Other Eruptive Fevers ...	3	—	—	—	—	—	·19
Influenza ...	—	—	—	—	—	—	—
Diphtheria ...	6	—	—	—	—	—	·43
Enteric Fever ...	30	8	—	8	—	—	6·87
Other Continued Fevers ...	533	—	—	—	—	—	21·16
Cholera ...	—	—	—	—	—	—	—
Dysentery ...	66	2	—	2	3	—	5·11
Yellow Fever ...	—	—	—	—	—	—	—
Malarial Fevers ...	33	—	—	—	—	—	1·24
Septic Diseases ...	4	—	—	—	—	—	·49
Tubercular Diseases ...	12	—	1	1	10	8	4·77
Syphilis, Primary ...	124	—	—	—	—	—	14·73
,, Secondary ...	230	1	—	1	5	3	28·74
Gonorrhœa ...	363	—	—	—	—	—	28·46
Hydrophobia ...	—	—	—	—	—	—	—
Parasitic Diseases ...	27	—	—	—	—	—	·88
Scurvy ...	—	—	—	—	—	—	—
Alcoholism ...	10	—	—	—	—	—	·48
Rheumatism ...	84	—	—	—	1	1	7·74
Debility ...	13	—	—	—	3	—	1·47
Other General Diseases ...	16	1	—	1	—	—	1·44
LOCAL DISEASES.							
Diseases of the—							
Nervous System { Nervous ...	15	2	—	2	2	2	1·06
Nervous System { Mental ...	2	—	—	—	3	1	1·15
Eye ...	95	—	—	—	1	1	5·26
Other Organs of Special Sense ...	57	—	—	—	3	2	3·68
Circulatory System ...	22	2	—	2	8	5	3·08
Respiratory ,, ...	90	5	—	5	2	1	7·14
Digestive ,, ...	313	4	—	4	4	2	13·18
Lymphatic ,, ...	62	—	—	—	—	—	7·82
Urinary ,, ...	3	—	—	—	—	—	·45
Generative ,, ...	422	—	—	—	—	—	37·22
Organs of Locomotion ...	45	—	—	—	2	1	2·95
Connective Tissue ...	73	—	—	—	1	1	3·75
Skin ...	174	—	—	—	—	1	10·21
INJURIES.							
General ...	8	4	—	4	3	2	1·11
Local ...	288	5	—	5	4	3	17·98
In Action ...	—	—	—	—	—	—	—
POISONS ...	3	1	—	1	—	—	·20
No appreciable disease ...	13	—	—	—	—	—	·22
Cause unknown (refers to deaths only) ...	—	—	—	—	—	—	—
General Total ...	3242	36	1	37	65	34	242·96

1st	Royal Inniskilling Fusiliers	515	281	1	4	13·54	545·6	1·94	7·77	26·29	9·59	17·58	Enniskillen and Londonderry, 12 months	9
2nd	Gloucestershire Regiment	575	464	1	19	30·92	806·9	1·74	33·04	53·77	19·63	24·32	Devonport, 8 months; Channel Islands, 4 months.	3
1st	Worcestershire Regiment	547	607	1	20	38·26	1109·7	1·83	36·56	69·94	25·53	23·00	Devonport and Tregantle, 12 months ...	1
1st	East Lancashire Regiment	19	40	—	—	1·60	2105·3	—	—	84·21	30·74	14·60	Portsmouth, 15 days. From India ...	—
2nd	East Lancashire Regiment	560	666	2	21	32·86	1189·3	3·57	37·50	58·68	21·42	18·01	Aldershot, 7 months; Portsmouth, 2½ months. To India.	—
2nd	East Surrey Regiment	670	373	1	5	19·58	556·7	1·49	7·46	29·22	10·66	19·16	Dover, 12 months	2
2nd	Duke of Cornwall's Light Infantry ...	551	339	—	17	18·29	615·2	—	30·38	33·19	12·11	19·69	Newry, 12 months	1
1st	Border Regiment	649	492	1	7	27·63	758·1	1·54	10·78	42·57	15·54	20·24	Aldershot, 10½ months. To Malta ...	—
1st	Royal Sussex Regiment	584	388	1	19	18·05	664·4	1·71	32·53	30·91	11·28	16·98	Brighton, 12 months	12
2nd	Hampshire Regiment	600	419	8	27	20·25	698·3	13·30	45·00	33·75	12·32	17·64	Birr and Dublin, 8 months; Cork, 4 months.	9
1st	South Staffordshire Regiment	640	570	—	19	37·96	890·6	—	29·69	59·31	21·65	24·31	Aldershot, 12 months	4
2nd	Dorsetshire Regiment	27	13	—	2	·48	481·5	—	74·07	17·78	6·49	13·47	Enniskillen and Londonderry, 1 month. To Malta.	—
1st	South Lancashire Regiment	572	414	1	8	22·29	723·8	1·75	13·99	38·97	14·22	19·65	Fermoy, 12 months	11
1st	Welsh Regiment	613	586	1	23	45·91	955·9	1·63	37·52	74·89	27·33	28·57	Devonport, 11 months; Aldershot, 1 month.	4
2nd	Royal Highlanders	695	403	4	8	19·28	579·8	5·75	11·51	27·74	10·12	17·46	York, 12 months	16
1st	Oxfordshire Light Infantry	616	489	1	19	31·59	793·8	1·62	30·84	51·28	18·72	23·58	Dublin, 7½ months; Curragh, 4½ months	10
1st	Essex Regiment	659	316	3	6	18·62	479·5	4·55	9·10	28·25	10·31	21·50	Warley, 10 months: London, 2 months...	13
1st	Derbyshire Regiment	659	425	1	17	27·05	644·9	1·52	25·80	41·05	14·98	23·23	Curragh, 12 months...	19
2nd	Loyal North Lancashire Regiment ...	737	623	2	18	36·67	845·3	2·71	24·42	49·76	18·16	21·55	Aldershot, 8 months; Curragh, 4 months	14
2nd	Northamptonshire Regiment	572	424	2	11	22·18	741·3	3·50	19·23	38·78	14·15	19·08	Aldershot, 4 months; Channel Islands, 8 months.	5
2nd	Royal Berkshire Regiment	709	440	2	16	25·15	620·6	2·82	22·57	35·47	12·95	20·86	Aldershot, 12 months	16
2nd	Royal West Kent Regiment	581	670	1	37	47·71	1153·2	1·72	63·68	82·12	29·97	25·99	Dublin, 12 months	15

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	INFANTRY—*cont.*										days.	days.		
1st	Yorkshire Light Infantry	611	328	1	13	16·58	536·8	1·64	21·28	27·13	9·90	18·45	Mullingar, 12 months	10
2nd	Shropshire Light Infantry	555	519	2	12	35·49	935·1	3·60	21·62	63·05	23·34	24·06	Portsmouth and Hilsea, 12 months ...	16
2nd	Middlesex Regiment	40	35	—	—	1·51	875·0	—	—	37·75	13·78	15·74	Woolwich, 2 months. From India ...	—
3rd	King's Royal Rifle Corps...	581	426	—	9	21·16	733·2	—	15·49	36·42	13·29	18·12	Shorncliffe, 1 month; Aldershot, 11 months.	6
4th	King's Royal Rifle Corps...	645	458	1	16	24·13	710·1	1·55	24·81	37·41	13·65	19·23	Aldershot, 12 months	5
2nd	Wiltshire Regiment	744	537	2	13	31·22	721·8	2·69	17·47	41·96	15·31	21·22	Portsmouth, 8 months; Channel Islands, 4 months.	2
1st	Manchester Regiment	496	495	1	19	31·25	998·0	2·02	38·31	63·00	22·99	23·04	Aldershot, 11 months. To Gibraltar ...	—
2nd	North Staffordshire Regiment	587	518	—	31	30·35	882·4	—	52·81	51·70	18·87	21·38	Belfast, 12 months	9
1st	York and Lancaster Regiment	596	579	4	18	32·22	971·5	6·71	30·20	54·06	19·73	20·31	Colchester, 12 months	13
1st	Durham Light Infantry	557	426	1	33	28·85	764·8	1·79	59·25	51·80	18·91	24·72	Dublin, 12 months	10
1st	Seaforth Highlanders	30	30	—	—	2·34	1000·0	—	—	78·00	28·47	28·47	Aldershot, 1 month. To Malta	—
2nd	Seaforth Highlanders	525	362	3	17	25·34	689·5	5·71	32·38	48·27	17·62	25·55	Dover, 9 months. From India	—
2nd	Gordon Highlanders	721	470	1	10	25·81	651·9	1·39	13·87	35·80	13·07	20·04	Aldershot, 12 months	16
2nd	Cameron Highlanders	166	74	2	—	3·08	445·8	12·05	—	18·55	6·77	15·19	Fort George, 9 months	—
1st	Royal Irish Rifles...	191	181	2	5	10·94	947·6	10·47	26·18	57·28	20·91	22·06	Aldershot, 4 months. To South Africa ...	—
2nd	Royal Irish Fusiliers	733	687	2	11	31·19	937·2	12·73	15·01	42·55	15·53	16·57	Cork, 5½ months; Aldershot, 2½ months; Colchester, 4 months.	13

ADMISSIONS into HOSPITAL, and DEATHS among the TROOPS ON BOARD
Colony or Station abroad to another, with the Ratios per 1,000 of the Strength,

Intercolonial.		Ratio per 1,000 of the Strength.					
14,865 529		Passage Out.		Passage Home.		Intercolonial.	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
—	—	—	—	2·5	1·25	—	—
—	—	3·0	—	—	—	—	—
—	—	18·1	—	—	—	—	—
—	—	—	—	—	—	—	—
1	1	1·0	1·01	1·2	—	1·9	1·89
50	—	6·0	—	8·8	—	94·5	—
—	—	—	—	6·3	5·01	—	—
2	—	—	—	6·3	—	3·8	—
22	—	3·0	—	224·0	—	41·6	—
1	—	1·0	—	1·2	—	1·9	—
2	—	—	—	1·2	—	3·8	—
78	—	96·5	—	142·7	—	147·4	—
25	—	52·3	—	81·4	—	47·3	—
128	—	222·1	—	190·2	—	238·2	—
—	—	—	—	—	—	—	—
3	—	29·1	—	10·0	—	5·7	—
	—	—	—	—	—	—	—
1	—	3·0	—	1·2	—	1·9	—
5	—	18·1	—	20·0	—	9·4	—
1	—	7·0	—	7·5	—	1·9	—
9	—	22·1	—	7·5	—	17·0	—
2	—	7·0	—	3·8	—	3·8	—
—	—	1·0	—	—	—	—	—
7	—	12·1	—	8·8	—	13·2	—
6	—	6·0	—	2·5	—	11·3	—
—	—	2·0	1·1	1·2	1·25	—	—
6	1	54·3	2·1	65·1	1·25	11·3	1·89
24	—	101·5	1·1	77·6	—	45·4	—
19	—	11·0	—	26·3	—	35·9	—
—	—	2·0	—	2·5	—	—	—
62	—	106·5	—	120·2	—	117·2	—
2	—	4·0	—	1·2	—	3·8	—
6	—	26·1	—	46·3	—	11·3	—
30	—	53·3	—	52·6	—	56·7	—
—	—	4·0	—	2·5	—	—	—
44	—	86·4	—	38·8	—	83·2	—
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
—	—	1·0	—	—	—	—	—
—	—	—	—	—	—	—	—
534	2	960·5	5·03	1161·4	8·76	1009·4	3·78

ABSTRACT No. XXIV.—ON THE INFLUENCE OF AGE ON THE MORTALITY.—Table showing the Death Rates of Warrant Officers, Non-commissioned Officers and Men, at the several Ages, arranged by quinquennial periods, in the several Commands Abroad.

Commands.	Under 20 Years.				20 and under 25.				25 and under 30.				30 and under 35.				35 and under 40.				40 and upwards.			
	Strength.	Died.	Ratio per 1,000.		Strength.	Died.	Ratio per 1,000.		Strength.	Died.	Ratio per 1,000.		Strength.	Died.	Ratio per 1,000.		Strength.	Died.	Ratio per 1,000.		Strength.	Died.	Ratio per 1,000.	
			1897.	1887–96.			1897.	1887–96.			1897.	1887–96.			1897.	1887–96.			1897.	1887–96.			1897.	1887–96.
Gibraltar	355	2	5·63	1·89	2,373	5	2·11	3·65	1,548	6	3·88	3·14	313	2	6·39	4·55	110	3	27·27	8·91	27	—	—	16·71
Malta	1,281	10	7·81	6·12	5,131	44	8·57	7·24	2,081	26	12·49	5·90	484	4	8·26	6·29	153	2	13·07	11·95	45	2	44·44	25·64
Egypt and Cyprus	155	—	—	10·72	2,536	17	6·70	11·78	1,342	15	11·18	9·06	276	2	7·25	9·74	110	2	18·18	15·34	30	—	—	16·39
Canada	92	—	—	1·33	847	—	—	2·57	416	—	—	3·71	181	—	—	7·81	40	—	—	15·91	25	—	—	4·61
Bermuda	36	—	—	7·63	910	9	9·89	9·56	429	5	11·65	8·27	92	2	21·74	14·69	43	—	—	6·04	11	—	—	9·90
West Indies	60	—	—	2·26	634	6	9·46	8·66	490	4	8·16	6·75	112	1	8·93	11·10	48	7	145·83	17·96	6	1	166·66	14·28
West Africa	—	—	—	—	9	—	—	—	15	1	66·66	—	5	—	—	—	7	1	142·85	—	2	—	—	—
South Africa and St. Helena ...	488	—	—	4·79	3,746	18	4·80	6·12	2,366	22	9·30	5·06	408	6	14·71	9·13	162	2	12·34	11·43	35	—	—	8·87
Mauritius	29	—	—	12·12	224	1	4·46	10·51	413	3	7·26	17·62	56	1	17·86	16·44	29	—	—	35·32	5	1	200·00	38·46
Ceylon	60	—	—	8·72	700	2	2·86	8·45	414	2	4·83	13·08	108	2	18·52	20·11	40	1	25·00	11·95	2	—	—	—
China	29	1	34·48	3·65	809	3	3·70	9·04	459	5	10·89	10·76	81	1	12·32	17·17	34	—	—	13·65	5	—	—	67·57
Straits Settlements	18	—	—	2·46	704	3	4·26	5·35	484	4	8·26	5·23	102	1	9·80	11·73	37	—	—	13·16	7	—	—	17·86
India	2,029	20	9·86	8·76	33,191	759	22·87	17·29	22,027	337	15·30	13·03	4,419	65	14·71	13·52	1,356	22	16·22	14·78	408	11	26·96	23·28

ABSTRACT No. XXV.—TABLE showing the general HEALTH STATISTICS of the various CORPS which served in the UNITED KINGDOM during the year 1897.

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	HOUSEHOLD CAVALRY.										days.	days.		
1st	Life Guards	390	279	1	11	13·44	715·4	2·56	28·21	34·44	12·57	17·58	London, 9 months; Windsor, 3 months	81
2nd	Life Guards	389	218	2	5	14·84	560·4	5·14	12·85	38·15	13·92	24·84	London, 12 months	81
	Royal Horse Guards	388	196	—	8	13·22	505·2	—	20·62	34·07	12·44	24·62	London, 3 months; Windsor, 9 months...	81
	Household Cavalry detached	12	—	—	1	1·42	—	—	83·33	118·33	43·19	—		
	Total Household Cavalry	1,179	693	3	25	42·91	587·8	2·54	21·20	36·39	13·28	22·60		
	CAVALRY.													
1st	Dragoon Guards	411	335	3	11	20·91	815·1	7·30	26·76	50·88	18·57	22·78	Colchester, 12 months	6
2nd	Dragoon Guards	382	330	—	5	18·82	863·9	—	13·09	49·27	17·98	20·81	Shorncliffe, 6 months; Leeds, 6 months	1
3rd	Dragoon Guards	411	391	6	9	24·31	951·3	14·60	21·90	59·15	21·59	22·69	Woolwich, 6 months; York, 6 months ...	2
6th	Dragoon Guards	642	436	—	11	25·59	679·1	—	17·13	39·86	14·55	21·42	Aldershot, 12 months	9
7th	Dragoon Guards	353	261	3	5	11·96	739·4	8·50	14·16	33·88	12·37	16·72	Norwich, 12 months	3
1st	Royal Dragoons	657	368	5	5	19·41	560·1	7·61	7·61	29·54	10·78	19·25	Belfast and Dundalk, 6 months; Hounslow, 4 months: Aldershot, 2 months.	41
2nd	Royal Dragoons	537	391	2	20	26·66	728·1	3·72	37·24	49·65	18·12	24·88	Hounslow, 6 months; Piershill and Maryhill, 5 months; Bulford Camp, 1 month.	41

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	REGIMENTAL DEPÔTS—*cont.*										days.	days.		
Depôt.	Yorkshire Light Infantry	173	100	2	4	6·00	578·0	11·56	23·12	34·68	12·66	21·90	Pontefract	Since formation.
"	Shropshire Light Infantry	172	50	1	—	1·59	290·7	5·81	—	9·24	3·37	11·60	Shrewsbury	"
"	Middlesex Regiment	155	56	3	6	3·42	361·3	19·35	38·71	22·06	8·05	22·29	Hounslow	"
"	Wiltshire Regiment	144	88	—	—	3·98	611·1	—	—	27·64	10·09	16·51	Devizes	"
"	Manchester Regiment	181	86	1	1	3·60	475·1	5·52	5·52	19·89	7·26	15·28	Ashton-under-Lyne	"
"	North Staffordshire Regiment	193	118	—	2	4·49	611·4	—	10·36	23·26	8·49	13·89	Lichfield	"
"	York and Lancaster Regiment	132	65	—	1	3·53	492·4	—	7·58	26·74	9·76	19·82	Pontefract	"
"	Durham Light Infantry	165	124	—	2	4·97	751·5	—	12·12	30·12	10·99	14·63	Newcastle	"
"	Highland Light Infantry	144	58	2	2	2·54	402·8	13·89	13·89	17·64	6·44	15·98	Hamilton	"
"	Seaforth Highlanders	119	52	—	1	1·97	437·0	—	8·40	16·55	6·04	13·83	Fort George	"
"	Gordon Highlanders	117	30	—	1	1·11	256·4	—	8·55	9·49	3·46	13·51	Aberdeen	"
"	Cameron Highlanders	122	26	—	1	1·24	213·1	—	8·20	10·16	3·68	17·41	Inverness	"
"	Royal Irish Rifles...	167	122	1	4	4·84	730·5	5·99	23·95	28·98	10·58	14·48	Belfast...	"
"	Royal Irish Fusiliers	176	47	2	2	1·94	267·0	11·36	11·36	11·02	4·02	15·07	Armagh	"
"	Connaught Rangers	191	68	1	1	2·70	356·0	5·23	5·23	14·14	5·16	14·59	Galway	"
"	Argyll and Sutherland Highlanders ...	131	54	1	2	1·55	412·2	7·63	15·27	11·83	4·32	10·47	Stirling	"

	ROYAL ARTILLERY.													
Depôt.	Horse Artillery	152	74	—	—	4·15	486·4	—	—	27·30	9·96	20·47	Woolwich, 12 months	Permanent.
D	Horse Artillery	136	91	1	1	5·93	669·1	7·35	7·35	43·60	15·91	23·78	Woolwich, 12 months	8
E	Horse Artillery	155	92	—	2	6·98	593·5	—	12·90	45·03	16·43	27·69	Aldershot, 12 months	8
G	Horse Artillery	164	83	—	5	4·27	539·0	—	32·47	27·73	10·12	18·78	London, 12 months	8
J	Horse Artillery	112	60	—	2	4·89	535·7	—	17·86	43·66	15·93	29·75	Woolwich, 9 months. To India	—
M	Horse Artillery	22	14	—	—	·47	636·4	—	—	21·36	7·80	12·25	Woolwich, 2½ months. From India ...	—
O	Horse Artillery	144	97		6	7·45	673·6	6·94	41·66	51·74	18·88	28·03	Woolwich, 7 months; Aldershot, 5 months.	8
P	Horse Artillery	132	85	1	1	3·05	643·9	7·58	7·58	23·11	8·43	13·10	Ipswich, 12 months	6
Q	Horse Artillery	127	93	—	4	4·73	732·3	—	31·50	37·24	13·50	18·56	Curragh, 12 months	2
R	Horse Artillery	122	112	—	6	6·04	918·0	—	49·18	49·51	18·07	19·68	Curragh, 9 months; Woolwich, 3 months	5
T	Horse Artillery	145	73	1	2	4·29	503·4	6·90	13·79	20·59	10·80	21·45	Aldershot, 12 months	4
U	Horse Artillery	131	83	—	1	7·31	633·6	—	7·63	55·80	20·37	32·14	Woolwich, 9 months; Curragh, 3 months.	2
—	Riding Establishment	96	43	—	2	3·99	447·9	—	20·83	41·56	15·17	33·87	Woolwich, 12 months	Permanent.
Depôt.	Field Artillery	377	324	6	8	21·01	859·4	15·91	21·22	55·73	20·34	23·67	Woolwich, 12 months	„
2nd	Field Battery	97	51	—	2	3·80	525·8	—	20·62	39·17	14·30	27·22	Shorncliffe, 12 months	1
4th	Field Battery	101	97	—	3	6·15	960·4	—	29·70	60·89	22·22	23·14	Shorncliffe, 12 months	7
5th	Field Battery	14	7	—	1	·34	500·0	—	71·43	24·29	8·86	17·72	Fermoy, 2 months. From India	—
7th	Field Battery	121	121	1	3	5·10	1000·0	8·26	24·79	42·15	15·38	15·38	Newcastle, 6 months; Dorchester, 6 months.	9
8th	Field Battery	135	86	—	4	4·14	637·0	—	29·63	30·67	11·19	17·57	Christchurch, 12 months	1
11th	Field Battery	128	56	—	2	2·19	437·5	—	15·63	17·11	6·24	14·27	Limerick, 10 months. To India	—
12th	Field Battery	210	121	—	5	7·68	576·2	—	23·81	36·57	13·35	23·17	Aldershot, 12 months	10
18th	Field Battery	56	32	—	1	1·35	571·4	—	17·86	24·11	8·80	15·40	Dorchester, 4½ months. To South Africa.	—

ABSTRACT No. XXVI. Table, taken from the Reports of the Principal Medical Officers, showing general Health Statistics of the various Corps which served in the different Commands Abroad during the Year 1897.

Battery, Company, or Batt'n.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Sick Average Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In the Command.	Of Invalids.	Total.			Admitted.	Died.	Invalided.	Constantly Sick.				
													days.	days.		
	GIBRALTAR.															
	Royal Artillery.															
11th	Eastern Division	39	14			—		·57	350·0	—	—	14·62	5·33	14·86	Gibraltar, 3 months. From England, 29th September.	—
14th	Eastern Division			–			2	·15	—	—	—	—	–	—	To England, 1st January	2
15th	Eastern Division	135	125	-	- -		5	7·65	925·9	-	37·04	56·67	20·68	22·34	Gibraltar, 11 months. To England, 5th December.	3
18th	Eastern Division	21	8		- -		—	·78	380·9	- -	—	37·14	13·56	35·59	Gibraltar, 1 month. From England, 22nd November.	—
19th	Eastern Division	156	118	1		1	—	7·79	756·4	6·41	·	49·94	18·23	24·10	Gibraltar, 12 months. From England, 6th January.	—
20th	Eastern Division	30	13		–	...	–	·78	433·3	—	—	26·00	9·49	21·90	Gibraltar, 1 month. From England, 22nd November.	—
21st	Eastern Division	154	99		--	–	2	6·71	642·9	- -	12·99	43·57	15·90	24·74	Gibraltar, 11 months. To England, 5th December.	2
22nd	Eastern Division	194	142	3	- -	3	5	9·39	732·0	15·46	25·77	48·40	17·66	24·13	Gibraltar, 11 months. To England, 5th December.	2
23rd	Eastern Division	222	154	1		1	7	9·83	693·7	4·50	31·53	44·28	16·16	23·20	Gibraltar, 12 months	2
2nd	Southern Division	158	180	—	1	1	6	13·02	1139·2	6·33	37·97	82·40	30·08	26·40	Gibraltar, 12 months	6
26th	Southern Division	157	197	—	–	—	5	12·74	1254·8	—	31·85	81·15	29·62	23·60	Gibraltar, 12 months	8
	Total	1,266	1,050	5	1	6	32	69·41	829·4	4·74	25·28	54·83	20·01	24·13		
	Royal Engineers.	380	157	2		2	7	9·91	413·1	5·26	18·42	26·08	[illegible]·52	23·04	Gibraltar, 12 months	Various.

1st	Grenadier Guards...	232	382	—	—	—	1	13·68	1431·0	—	4·31	58·97	21·53	15·04	Gibraltar, 9 months. From England, 3rd October.	—
	Infantry Regiments.															
1st	Northumberland Fusiliers ...	981	961	4	1	5	33	73·33	979·6	5·10	33·64	74·75	27·28	27·85	Gibraltar, 12 months. Draft from 2nd battalion joined from Singapore in January.	
1st	South Wales Borderers	889	763	4	—	4	31	55·21	858·3	4·50	34·87	62·10	22·67	26·41	Gibraltar, 11 months. To India, 22nd November.	2
1st	Cameron Highlanders	714	446	—	—	—	10	32·78	624·6	—	14·01	45·91	16·76	26·83	Gibraltar, 9 months. To Egypt, 4th October.	
1st	Manchester Regiment	73	84	—	—	—	—	3·72	1150·7	—	—	50·96	18·60	16·16	Gibraltar, 1 month. From England, 22nd November.	—
	Other Corps	2	23	1	—	1	6	1·53	—	—	—	—	—	—	—	—
	Total	2,659	2,277	9	1	10	80	166·57	856·4	3·76	30·09	62·64	22·87	26·70		
	Garrison Staff and Departments.															
	Army Service Corps	54	19	—	—	—	—	1·38	351·8	—	—	25·56	9·33	26·51	Gibraltar, 12 months	Various.
	Medical Staff Corps	80	42	2	—	2	3	2·26	525·0	25·00	37·50	28·25	10·31	19·64	Gibraltar, 12 months	Various.
	Army Ordnance Corps	41	8	—	—	—	—	·39	195·1	—	—	9·51	3·47	17·79	Gibraltar, 12 months	Various.
	Garrison Staff, &c.	14	3	—	—	—	—	·15	214·3	—	—	10·71	3·91	18·25	Gibraltar, 12 months	Various.
	Total	189	72	2	—	2	3	4·18	380·9	10·58	15·87	22·12	8·07	21·19		
	Grand Total ...	4,726	3,888	18	2	20	123	263·75	822·7	4·23	26·03	55·81	20·37	24·76		
	MALTA.															
	Royal Artillery.															Various.
4th	Mountain Battery...	125	140	2	—	2	2	6·17	1120·0	16·00	16·00	49·36	18·02	16·09	Crete, 7½ months; Verdala, 1 month. From England, 19th April.	—
5th	Eastern Division	182	83	—	—	—	2	5·84	456·0	—	10·99	32·09	11·71	25·68	St. Elmo, 12 months	1
17th	Eastern Division	174	111	1	1	2	4	5·65	637·9	11·50	22·99	32·47	11·85	18·58	Fort Tigne and Hutments, 12 months ...	1

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	ROYAL ARTILLERY—*cont.*										days.	days.		
88th	Field Battery	73	59	—	—	3·11	808·2	—	—	42·60	15·55	19·24	Weedon, 7 months; Woolwich, 1 month	—
4th	Mountain Battery...	179	145	1	7	7·67	810·1	5·59	39·11	42·85	15·64	19·30	Newport, 3 months. To Malta	—
	Garrison Artillery, Eastern Division ...	1,550	746	2	22	38·32	481·3	1·29	14·19	24·72	9·02	18·75	Various	—
	Garrison Artillery, Southern Division	2,686	1,285	14	27	71·26	478·4	5·21	10·05	26·53	9·68	20·24	Various	—
	Garrison Artillery, Western Division	1,667	798	8	26	49·32	478·7	4·80	15·60	29·59	10·80	22·56	Various	—
	District Establishment	735	120	8	3	9·51	163·3	10·88	4·08	12·94	4·72	28·92	Various	—
	Regimental District Staff	972	205	5	3	18·01	210·9	5·14	3·09	18·53	6·76	32·06	Woolwich	—
	School of Gunnery	400	86	2	2	6·06	215·0	5·00	5·00	15·15	5·53	25·72	Shoeburyness...	—
	Various	732	217	1	14	23·85	296·4	1·37	19·12	32·58	11·89	40·12	Various	—
	Total Royal Artillery	16,237	8,686	65	232	527·51	534·9	4·00	14·29	32·49	11·86	22·16		
	ROYAL ENGINEERS.													
	Royal Engineers	4,380	1,401	16	41	77·92	319·2	3·64	9·34	17·75	6·48	20·30	Various	—
	FOOT GUARDS.													
1st	Grenadier Guards...	606	380	4	15	27·96	627·1	6·60	24·75	46·15	16·84	26·89	London, 5 months. To Gibraltar ...	—

2nd	Grenadier Guards...	685	616	2	14	43·46	899·3	2·92	20·44	63·44	23·16	25·58	London, 8 months; Windsor, 4 months...	6
3rd	Grenadier Guards...	764	591	2	22	42·84	773·6	2·62	28·80	56·07	20·46	26·55	London, 12 months	12
1st	Coldstream Guards	749	385	3	19	35·08	514·0	4·00	25·37	46·84	17·10	24·91	London, 12 months	12
2nd	Coldstream Guards	786	411	3	13	36·52	523·0	3·82	16·54	46·46	16·96	32·43	London, 4 months; Windsor, 8 months...	15
3rd	Coldstream Guards	24	22	—	—	·46	916·7	—	—	19·17	7·00	7·63	Woolwich, 1 month	—
1st	Scots Guards	760	566	6	18	41·01	744·7	7·89	23·68	53·96	19·69	26·44	London, 12 months	15
2nd	Scots Guards	743	505	2	21	35·07	679·7	2·69	28·26	47·20	17·23	25·35	London, 8 months; Dublin, 4 months ...	12
	Detachments	122	96	—	5	67·82	786·9	—	40·98	555·90	200·75	257·86		
	Total Foot Guards	5,230	3,572	22	127	330·22	681·8	4·20	24·18	63·03	23·01	33·74		
	INFANTRY.													
1st	Royal Scots	702	402	—	10	25·70	572·6	—	14·25	36·62	13·37	23·33	Edinburgh Castle, 12 months	6
2nd	Royal West Surrey Regiment	535	490	—	23	28·24	915·9	—	42·99	52·78	19·26	21·03	Aldershot, 12 months	3
2nd	East Kent Regiment	581	337	1	12	19·04	580·0	1·72	20·65	32·77	11·96	20·62	Kilkenny, 12 months	11
2nd	Royal Lancaster Regiment	614	654	—	13	42·02	1065·1	—	21·17	68·44	24·98	23·45	Manchester, 6 months; Devonport, 6 months.	1
2nd	Northumberland Fusiliers	525	375	2	2	20·23	714·3	3·81	3·81	38·53	14·06	19·69	Portland, 12 months...	1
2nd	Royal Warwickshire Regiment... ...	615	607	—	15	34·45	987·0	—	24·39	56·02	20·44	20·71	Chatham, 12 months; Detachment at Gravesend.	1
2nd	Royal Fusiliers	659	438	3	28	32·10	664·6	4·55	42·49	48·71	17·78	26·75	Belfast and Holywood, 6½ months; Curragh, 5½ months.	8
2nd	(King's) Liverpool Regiment	630	876	2	41	53·33	1390·5	3·17	65·08	84·65	30·90	22·22	Colchester, 7 months; Aldershot, 2 months; Holywood, 3 months.	5
2nd	Norfolk Regiment...	567	169	3	4	8·89	298·1	5·29	7·05	15·68	5·72	19·20	Kinsale, 12 monhts	7
2nd	Lincolnshire Regiment	630	383	4	23	28·52	607·9	6·35	36·51	45·27	16·52	27·25	Woolwich, 6 months; Aldershot, 2½ months; Sheffield, 3½ months.	2
2nd	Devonshire Regiment	678	347	1	11	20·21	511·8	1·47	16·22	29·81	10·88	21·26	Pembroke Dock, 7 months; Aldershot, 5 months.	4

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	INFANTRY—*cont.*										days.	days.		
1st	Suffolk Regiment	202	124	1	4	9·09	613·9	4·95	19·80	45·00	16·42	26·76	Aldershot, 3 months. To Malta	—
2nd	Somersetshire Light Infantry	639	444	1	14	23·01	694·8	1·56	21·91	36·01	13·14	18·91	Channel Islands, 5 months; South-Eastern Manœuvres, 1 month; Aldershot, 6 months.	3
2nd	West Yorkshire Regiment	620	377	—	11	20·61	608·1	—	17·74	33·24	12·13	19·95	Dover, 12 months	1
2nd	East Yorkshire Regiment	539	444	1	14	24·88	823·7	1·85	25·97	46·16	16·85	20·46	Curragh, 8 months; Tipperary, 4 months	9
2nd	Bedfordshire Regiment	598	338	1	7	14·98	565·2	1·67	11·71	25·05	9·14	16·18	Lichfield, 12 months	5
2nd	Leicestershire Regiment...	649	376	3	9	18·87	579·3	4·62	13·87	29·07	10·61	18·32	Cork, 12 months	7
1st	Royal Irish Regiment	617	445	2	7	18·28	721·2	3·24	11·34	29·64	10·82	14·99	Limerick and Templemore, 12 months ...	12
1st	Yorkshire Regiment	541	560	2	19	29·19	1035·1	3·70	35·12	53·95	19·69	19·02	Curragh, 8 months; Dublin, 4 months ...	8
1st	Lancashire Fusiliers	645	580	—	19	27·54	899·2	—	29·46	42·70	15·58	17·33	Athlone, 4 months; Preston, 8 months...	17
2nd	Royal Scots Fusiliers	611	537	4	10	32·76	878·9	6·55	16·37	53·62	19·57	22·26	Chatham, 12 months; Detachment at Gravesend.	1
2nd	Cheshire Regiment	588	385	2	16	20·13	654·8	3·40	27·21	34·23	12·49	19·08	Buttevant, 12 months	8
1st	Royal Welsh Fusiliers	22	30	1	—	·13	1363·6	45·45	—	5·91	2·15	1·57	Tregantle, 23 days. From Aden	—
2nd	South Wales Borderers	689	426	1	9	28·71	618·3	1·45	13·06	41·67	15·21	24·60	Aldershot, 6 months; Newport and Pembroke Dock, 6 months.	4
1st	King's Own Scottish Borderers... ...	655	655	2	38	51·49	1000·0	3·05	58·01	78·61	28·69	28·69	Aldershot, 12 months	6
2nd	Scottish Rifles	574	330	3	13	17·66	574·9	5·23	22·65	30·77	11·23	19·53	Parkhurst, 10½ months; Aldershot, 1½ months.	2

1st	Royal Inniskilling Fusiliers	515	281	1	4	13·54	545·6	1·94	7·77	26·29	9·59	17·58	Enniskillen and Londonderry, 12 months	9
2nd	Gloucestershire Regiment	575	464	1	19	30·92	806·9	1·74	33·04	53·77	19·63	24·32	Devonport, 8 months; Channel Islands, 4 months.	3
1st	Worcestershire Regiment	547	607	1	20	38·26	1109·7	1·83	36·56	69·94	25·53	23·00	Devonport and Tregantle, 12 months ...	1
1st	East Lancashire Regiment	19	40	—	—	1·60	2105·3	—	—	84·21	30·74	14·60	Portsmouth, 15 days. From India ...	—
2nd	East Lancashire Regiment	560	666	2	21	32·86	1189·3	3·57	37·50	58·68	21·42	18·01	Aldershot, 7 months; Portsmouth, 2½ months. To India.	—
2nd	East Surrey Regiment	670	373	1	5	19·58	556·7	1·49	7·46	29·22	10·66	19·16	Dover, 12 months	2
2nd	Duke of Cornwall's Light Infantry ...	551	339	—	17	18·29	615·2	—	30·88	33·19	12·11	19·69	Newry, 12 months	1
1st	Border Regiment	649	492	1	7	27·63	758·1	1·54	10·78	42·57	15·54	20·24	Aldershot, 10½ months. To Malta ...	—
1st	Royal Sussex Regiment	584	388	1	19	18·05	664·4	1·71	32·53	30·91	11·28	16·98	Brighton, 12 months	12
2nd	Hampshire Regiment	600	419	8	27	20·25	698·3	13·30	45·00	33·75	12·32	17·64	Birr and Dublin, 8 months; Cork, 4 months.	9
1st	South Staffordshire Regiment	640	570	—	19	37·96	890·6	—	29·69	59·31	21·65	24·31	Aldershot, 12 months	4
2nd	Dorsetshire Regiment	27	13	—	2	·48	481·5	—	74·07	17·78	6·49	13·47	Enniskillen and Londonderry, 1 month. To Malta.	—
1st	South Lancashire Regiment	572	414	1	8	22·29	723·8	1·75	13·99	38·97	14·22	19·65	Fermoy, 12 months	11
1st	Welsh Regiment	613	586	1	23	45·91	955·9	1·63	37·52	74·89	27·33	28·57	Devonport, 11 months; Aldershot, 1 month.	4
2nd	Royal Highlanders	695	403	4	8	19·28	579·8	5·75	11·51	27·74	10·12	17·46	York, 12 months	16
1st	Oxfordshire Light Infantry	616	489	1	19	31·59	793·8	1·62	30·84	51·28	18·72	23·58	Dublin, 7½ months; Curragh, 4½ months	10
1st	Essex Regiment	659	316	3	6	18·62	479·5	4·55	9·10	28·25	10·31	21·50	Warley, 10 months; London, 2 months...	13
1st	Derbyshire Regiment	659	425	1	17	27·05	644·9	1·52	25·80	41·05	14·98	23·23	Curragh, 12 months...	19
2nd	Loyal North Lancashire Regiment ...	737	623	2	18	36·67	845·3	2·71	24·42	49·76	18·16	21·55	Aldershot, 8 months; Curragh, 4 months	14
2nd	Northamptonshire Regiment	572	424	2	11	22·18	741·3	3·50	19·23	38·78	14·15	19·08	Aldershot, 4 months; Channel Islands, 8 months.	5
2nd	Royal Berkshire Regiment	709	440	2	16	25·15	620·6	2·82	22·57	35·47	12·95	20·86	Aldershot, 12 months	16
2nd	Royal West Kent Regiment	581	670	1	37	47·71	1153·2	1·72	63·68	82·12	29·97	25·99	Dublin, 12 months	15

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In the Command	Of Invalids.	Total.			Admitted.	Died.	Invalided	Constantly Sick.				
	Bermuda—*cont.*												days.	days.		
	Garrison Staff and Departments—cont.															
	Army Ordnance Corps	37	10	—	—	—	1	·49	270·3	—	27·03	13·24	4·83	17·88	Various	Various.
	Garrison Staff	6	—	—	—	—	—	—	—	—	—	—	—	—	Various	Various.
	Total	74	18	—	—	—	1	1·11	243·2	—	13·51	15·00	5·47	22·51		
	Grand Total	1,521	687	16	1	17	16	40·64	451·7	11·18	10·52	26·72	9·75	21·59		
	West Indies.															
	Barbados, &c.															
	Royal Artillery.															
1st	Western Division	18	40	—	—	—	—	1·50	2222·2	—	—	83·33	30·42	13·69	Barbados and St. Lucia, 1¾ months. From Halifax, N.S., 8th November.	—
23rd	Western Division	125	173	2	—	2	4	11·90	1384·0	16·00	32·00	95·20	34·75	25·11	Barbados and St. Lucia, 10¼ months. To South Africa, 8th November.	3
	District Establishment	3	2	—	—	—	—	·18	666·7	—	—	60·00	21·90	32·85	St. Lucia, 12 months	3
	St. Lucia Company	3	—	—	—	—	—	—	—	—	—	—	—	—	St. Lucia, 12 months	Various.
	Total	149	215	2	—	2	4	13·58	1442·9	13·42	26·85	91·14	33·27	23·05		
	Royal Engineers.	15	3	—	—	—	—	·08	200·0	—	—	5·33	1·95	9·73	Barbados and St. Lucia, 12 months ...	Various.

	Infantry Regiments.															
1st	Liverpool Regiment	508	914	1	—	1	23	61·74	1790·2	1·97	45·28	121·54	41·36	24·66	Barbados and St. Lucia, 10¼ months. To South Africa, 8th November.	2
1st	Royal Berkshire Regiment ..	57	96	—	—	—	—	4·80	1684·2	—	—	84·21	30·74	18·25	Barbados and St. Lucia, 1¾ months. From Halifax, N.S., 8th November.	—
	West India Regiment	5	5	—	—	—	1	·24	1000·0	—	200·00	48·00	17·52	17·52	Barbados and St. Lucia, 10½ months. To West Africa, 16th November.	Various.
	Total	570	1,015	1	—	1	24	66·78	1780·7	1·75	42·11	117·16	42·76	24·01		
	Garrison Staff and Departments.	33	15	1	—	1	—	·60	454·5	30·30	—	18·18	6·64	14·60	Barbados and St. Lucia, 12 months.	Various.
	Total, Barbados, &c. ...	767	1,248	4	—	4	28	81·04	1627·1	5·23	36·50	105·66	38·56	23·70		
	JAMAICA.															
	Royal Artillery.															
22nd	Southern Division...	26	18	1	—	1	—	1·01	692·3	38·46	—	38·84	14·18	20·48	Newcastle and Port Royal, 1⅔ months. From Malta, 11th November.	—
14th	Western Division	123	115	—	1	1	2	7·86	935·0	8·13	16·26	63·90	23·22	24·94	Newcastle and Port Royal, 10⅓ months. To South Africa, 12th November.	3
	Jamaica Company	3	—	—	—	—	—	—	—	—	—	—	—	—	Port Royal, 12 months	5
	Total	152	133	1	1	2	2	8·87	875·0	13·16	13·16	58·35	21·30	24·34		
	Royal Engineers.	42	24	4	—	4	—	1·13	571·4	95·24	—	26·90	9·82	17·18	Various	—
	Infantry Regiments.															
1st	Liverpool Regiment	292	272	2	—	2	11	22·21	934·9	6·85	37·67	76·06	27·76	29·80	Newcastle and Up Park Camp, 10⅓ months. To South Africa, 12th November.	1
1st	Royal Berkshire Regiment ...	49	33	3	—	3	—	1·68	673·5	61·22	—	34·28	12·51	18·58	Newcastle and Up Park Camp, 1⅔ months. From Halifax, N.S., 11th November.	—
	West India Regiment	14	9	—	—	—	—	·44	642·8	—	—	31·42	11·47	17·84	Up Park Camp	Various.
	Total	355	314	5	—	5	11	24·33	884·5	14·08	30·98	68·53	25·01	28·28		

Battery or Battalion.	Corps.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided.	Average Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years at Home since last return from Service Abroad.
							Admitted.	Died.	Invalided.	Average Constantly Sick.				
	REGIMENTAL DEPÔTS—*cont.*										days.	days.		
Depôt.	Devonshire Regiment	127	50	1	1	2·17	393·7	7·87	7·87	17·09	6·23	15·84	Exeter	Since formation.
"	Suffolk Regiment	142	80	3	1	2·17	563·4	21·13	7·04	15·28	5·58	9·00	Bury St. Edmund's	"
"	Somersetshire Light Infantry	173	58	3	1	1·69	335·3	17·34	5·78	9·77	3·57	10·62	Taunton	"
"	West Yorkshire Regiment	190	125	1	2	5·14	628·1	5·02	10·05	25·83	9·43	15·01	York	"
"	East Yorkshire Regiment	142	46	—	—	1·01	323·9	—	—	7·11	2·59	8·01	Beverley	"
"	Bedfordshire Regiment	135	73	—	—	2·80	540·7	—	—	20·74	7·57	14·00	Bedford	"
"	Leicestershire Regiment	175	127	1	2	4·05	725·7	5·71	11·43	23·14	8·45	11·64	Leicester	"
"	Royal Irish Regiment	171	111	—	2	3·66	649·1	—	11·69	21·40	7·81	12·08	Clonmel	"
"	Yorkshire Regiment	186	44	—	2	3·30	236·6	—	10·75	17·74	6·47	27·37	Richmond	"
"	Lancashire Fusiliers	168	79	—	4	4·73	470·1	—	23·81	28·15	10·27	21·85	Bury	"
"	Royal Scots Fusiliers	136	114	—	5	4·54	838·2	—	36·76	33·38	12·18	14·53	Ayr	"
"	Cheshire Regiment	151	81	—	3	3·55	536·4	—	19·87	23·51	8·58	16·00	Chester	"
"	Royal Welsh Fusiliers	120	146	4	4	4·56	1216·7	33·33	33·33	38·00	13·87	11·40	Wrexham	"
"	South Wales Borderers	201	129	3	1	4·91	641·8	14·92	4·97	24·43	8·93	13·89	Brecon	"
"	King's Own Scottish Borderers	121	74	—	—	2·45	611·6	—	—	20·25	7·39	12·08	Berwick-on-Tweed	"
"	Scottish Rifles	153	59	—	1	2·80	385·6	—	6·54	18·30	7·64	17·32	Hamilton	"

	St. Helena Detachment	91	97	—	—	—	1	3·88	1065·9	—	10·99	42·64	15·56	14·60	St. Helena, 12 months	—
	District Establishment	43	17	—	—	—	—	1·86	395·4	—	—	43·26	15·79	39·94	Cape Town and Simonstown, 12 months	—
		797	758	2	1	3	*8	45·43	951·1	2·51	10·03	57·00	20·81	21·88		
29th	*Royal Engineers*	103	55	1	—	1	—	3·57	533·9	9·71	—	34·66	12·65	23·69	Various	11
	Infantry Regiments.															
1st	Liverpool Regiment	54	67	—	—	—	—	3·06	1240·7	—	—	56·66	20·68	16·67	Cape Town and Wynberg, 23 days. From West Indies, 9th December.	—
1st	Leicestershire Regiment... ...	958	831	4	—	4	7	52·49	867·4	4·18	7·31	54·79	19·99	23·06	Cape Town, Wynberg and Simonstown, 11½ months; Pietermaritzburg, ½ month. Detachment, St. Helena, 11 months.	2
2nd	West Riding Regiment	879	863	5	—	5	12	58·45	981·8	5·69	13·65	66·49	24·27	24·72	Pietermaritzburg, 11½ months. To India, 18th December.	4
1st	Middlesex Regiment	655	574	4	—	4	11	38·34	876·4	6·11	16·79	58·53	21·37	24·38	Wynberg, 6 months; King William's Town and Graham's Town, 6 months.	1
1st	King's Royal Rifle Corps... ..	464	332	2	—	2	2	24·83	715·5	4·31	4·31	53·51	19·53	27·30	Wynberg and Cape Town, 12 months ...	1
2nd	King's Royal Rifle Corps... ...	978	670	4	—	4	*9	50·34	685·1	4·09	9·20	51·47	18·79	27·42	Cape Town, 6 months; Wynberg, 6 months. Detachment, Simonstown, 1 month.	1
2nd	York and Lancaster Regiment ...	12	8	1	—	1	4	1·11	666·6	83·33	333·33	92·50	33·76	50·64	Wynberg, 5 days. To India, 5th January.	5
1st	Royal Irish Rifles...	364	298	5	—	5	—	14·26	818·7	13·74	—	39·18	14·30	17·47	Ladysmith, 7 months. From England, 24th May.	—
2nd	Royal Dublin Fusiliers	531	727	3	—	3	—	43·92	1369·1	5·65	—	82·71	30·19	22·05	Pietermaritzburg, 7 months; Detachment, Eshowe, 4 months. From India, 3rd June.	—
	Mounted Infantry...	159	193	2	—	2	7	11·68	1213·8	12·58	44·03	73·46	26·81	22·09	Pietermaritzburg, 5 months. To England, 24th May.	1
	Total	5,054	4,563	30	—	30	*42	298·48	902·9	5·94	10·29	59·66	21·56	23·88		
	Garrison Staff and Departments.															
	Army Service Corps	43	15	1	—	1	—	1·33	348·8	23·26	—	30·93	11·29	32·36	Various	Various.
	Medical Staff Corps	118	56	2	—	2	5	5·23	474·6	16·95	42·37	44·32	16·18	34·09	Various	Various.
	Army Ordnance Corps	56	18	2	1	3	—	1·87	321·4	53·57	—	33·39	12·19	37·92	Various	Various.
	Garrison Staff, etc.	30	8	—	—	—	1	1·46	266·6	—	33·33	48·66	17·76	66·61	Various	Various.
	Total	247	97	5	1	6	6	9·89	392·7	24·29	24·29	40·04	14·61	37·21		
	Grand total	7,205	6,298	48	2	50	*77	411·97	874·1	6·94	10·69	57·18	20·87	23·88		

* Includes 1 man discharged in the Command.

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In Command.	Of Invalids.	Total.			Admitted.	Died.	Invalids.	Constantly Sick.				
	Mauritius.												days.	days.		
	Royal Artillery.															
24th	Western Division	114	189	1	—	1	12	11·08	1657·3	8·77	105·26	97·19	35·47	21·40	Curepipe and Port Louis, 12 months. To Malta, 28th December.	3
26th	Western Division	1	2	—	—	—	—	·14	—	—	—	—	—	—	Curepipe and Port Louis. From South Africa, 27th December.	—
	District Staff, etc....	9	6	—	—	—	—	·18	666·6	—	—	20·00	7·30	10·95	Port Louis, 12 months	—
	Total	124	197	1	—	1	12	11·40	1588·7	8·06	96·77	91·93	33·57	21·12		
	Royal Engineers.	72	52	1	—	1	4	4·64	722·2	13·88	55·55	64·30	23·52	32·56	Curepipe and Port Louis, 12 months ...	—
	Infantry Regiments.															
2nd	York and Lancaster Regiment ...	63	73	—	1	1	2	6·29	1158·7	15·87	31·74	99·84	36·44	31·45	Curepipe and Port Louis, 1 month. To India, 2nd February.	—
1st	King's Royal Rifle Corps ...	469	553	4	—	4	20	38·07	1179·1	8·53	42·64	81·17	29·63	25·13	Curepipe and Port Louis, 11½ months. From India, 18th January.	—
	Total	532	626	4	1	5	22	44·36	1176·7	9·40	41·35	83·38	30·43	25·86		
	Garrison Staff and Departments.	28	6	—	—	—	—	·20	214·3	—	—	7·14	2·60	12·16	Curepipe and Port Louis, 12 months ...	—
	Grand Total	756	881	6	1	7	38	60·60	1165·3	9·26	50·26	80·16	29·26	25·10		

	CEYLON.															
	Royal Artillery.															
6th	**Southern Division... ... ...**	119	56	1	—	1	—	2·35	470·6	8·40	—	19·75	7·21	15·31	**Trincomali, 12 months ... ...**	**2**
37th	**Southern Division... ... ...**	122	104	1	—	1	2	7·39	852·5	8·20	16·39	60·57	22·11	25·94	**Colombo, 12 months ... ...**	**2**
	Total	241	160	2	—	2	2	9·74	663·9	8·30	8·30	40·41	14·75	22·22		
	Royal Engineers.	83	62	1	—	1	—	2·42	747·0	12·05	—	29·16	10·64	14·24	**Colombo and Trincomali, 12 months ...**	**—**
	Infantry Regiments.															
1st	**Loyal North Lancashire Regiment.**	960	1,211	4	1	5	12	62·91	1261·5	5·21	12·50	65·53	23·92	18·96	**Colombo, 12 months. Detachments at Kandy and Trincomali.**	**1**
1st	**West Yorkshire Regiment ...**	—	—	—	—	—	—	·24	—	—	—	—	—	—	**en route to Hong Kong ... ...**	**—**
	Total	960	1,211	4	1	5	12	63·15	1261·5	5·21	12·50	65·78	24·01	19·03		
	Garrison Staff and Departments.	40	10	—	—	—	—	·45	250·0	—	—	11·25	4·11	16·42	**Various ... ...**	**Various.**
	Grand Total	1,324	1,443	7	1	8	14	75·76	1089·9	6·04	10·57	57·22	20·89	19·16		
	CHINA.															
	Royal Artillery.															
12th	**Southern Division... ... ...**	109	193	1	—	1	11	11·86	1770·6	9·17	100·91	108·80	39·71	22·42	**Hong Kong, 12 months ... ...**	**3**
35th	**Southern Division... ... ...**	101	186	3	—	3	7	11·93	1841·5	29·70	69·30	118·11	43·11	23·41	**Hong Kong, 12 months ... ...**	**3**
	Total	210	379	4	—	4	18	23·79	1804·7	19·04	85·71	113·28	41·34	22·91		
	Royal Engineers.	160	148	4	—	4	9	7·04	925·0	25·00	56·25	44·00	16·06	17·36	**Hong Kong, 12 months ... ...**	**Various.**
	Infantry Regiments.															
1st	**Royal Lancaster Regiment ...**	17	36	—	—	—	—	1·14	2117·6	—	—	67·05	24·47	11·55	**Hong Kong, 6 days. From Malta, 26th December.**	**—**
1st	**West Yorkshire Regiment ...**	978	2,364	2	1	3	41	127·58	2417·1	3·07	41·92	130·44	47·61	19·69	**Hong Kong, 12 months ... ...**	**1**
1st	**Rifle Brigade ... ...**	—	—	—	—	—	—	·03	—	—	—	—	—	—	—	—
	Total	995	2,400	2	1	3	41	128·75	2412·0	3·01	41·20	129·39	47·22	19·58		

Corps and Commands	Annual ...h.	... into ...al.	Deaths. ...nd.	Deaths. ...ids.	Deaths. ...tal.	...alids sent Home.	...verage Number Constantly Sick.	Ratio per 1,000 of Strength. Admitted.	Ratio per 1,000 of Strength. Died.	Ratio per 1,000 of Strength. Invalids.	Ratio per 1,000 of Strength. Constantly Sick.	Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
												days.	days.		
CHINA—cont.															
Garrison Staff and Departments	112	46												Curepipe and Port Louis, 12 months. Malta, 28th December.	3
														...and Port Louis. From South ... December.	—
														...ths	—
Grand Total	1,417	2,073	10	[illegible]	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
STRAITS SETTLEMENTS.															
Royal Artillery.															
25th Southern Division...	126	178			—	4	12·63	1412·7		31·75	100·24	40·[illegible]	[illegible]		
28th Southern Division...	130	220	2		2	2	13·03	1692·3	15·38	15·38	100·23	36·68	21·62		
Total	256	398	2		2	6	25·66	1554·7	7·81	23·44	100·23	36·59	23·53		
Royal Engineers.	88	37			—		1·91	420·5		—	21·70	7·92	18·84	Various ...	
Infantry Regiments.															
1st Northumberland Fusiliers ...			—	1	1									Battalion left for England in November, 1896.	
1st Rifle Brigade	970	907	6		6	9	61·63	935·1	6·19	9·28	63·54	23·19	24·80	Fort Canning, Penang, and Tanglin, 12 months.	1
Garrison Staff and Departments.	38	15				—	·61	394·7		—	16·05	5·86	14·84	Fort Canning, Penang, and Tanglin, 12 months.	Various.
Grand Total	1,352	1,357	8	1	9	15	89·81	1003·7	6·66	11·09	66·43	24·25	24·16		

	GIBRALTAR—*cont.*															
	Foot Guards.															
1st	Grenadier Guards...	232	332	—	—	—	1	13·68	1431·0	—	4·31	58·97	21·53	15·04	Gibraltar, 9 months. From England, 3rd October.	—
	Infantry Regiments.															
1st	Northumberland Fusiliers ...	981	961	4	1	5	33	73·33	979·6	5·10	33·64	74·75	27·28	27·85	Gibraltar, 12 months. Draft from 2nd battalion joined from Singapore in January.	
1st	South Wales Borderers	889	763	4	—	4	31	55·21	858·3	4·50	34·87	62·10	22·67	26·41	Gibraltar, 11 months. To India, 22nd November.	2
1st	Cameron Highlanders	714	446	—	—	—	10	32·78	624·6	—	14·01	45·91	16·76	26·83	Gibraltar, 9 months. To Egypt, 4th October.	
1st	Manchester Regiment	73	84	—	—	—	—	3·72	1150·7	—	—	50·96	18·60	16·16	Gibraltar, 1 month. From England, 22nd November.	—
	Other Corps	2	23	1	—	1	6	1·53	—	—	—	—	—	—	—	—
	Total	2,659	2,277	9	1	10	80	166·57	856·4	3·76	30·09	62·64	22·87	26·70		
	Garrison Staff and Departments.															
	Army Service Corps	54	19	—	—	—	—	1·38	351·8	—	—	25·56	9·33	26·51	Gibraltar, 12 months	Various.
	Medical Staff Corps	80	42	2	—	2	3	2·26	525·0	25·00	37·50	28·25	10·31	19·64	Gibraltar, 12 months	Various.
	Army Ordnance Corps	41	8	—	—	—	—	·39	195·1	—	—	9·51	3·47	17·79	Gibraltar, 12 months	Various.
	Garrison Staff, &c.	14	3	—	—	—	—	·15	214·3	—	—	10·71	3·91	18·25	Gibraltar, 12 months	Various.
	Total	189	72	2	—	2	3	4·18	380·9	10·58	15·87	22·12	8·07	21·19		
	Grand Total ...	4,726	3,888	18	2	20	123	263·75	822·7	4·23	26·03	55·81	20·37	24·76		
	MALTA.															
	Royal Artillery.															Various.
4th	Mountain Battery...	125	140	2	—	2	2	6·17	1120·0	16·00	16·00	49·36	18·02	16·09	Crete, 7½ months; Verdala, 1 month. From England, 19th April.	—
5th	Eastern Division	182	83	—	—	—	2	5·84	456·0	—	10·99	32·09	11·71	25·68	St. Elmo, 12 months	1
17th	Eastern Division	174	111	1	1	2	4	5·65	637·9	11·50	22·99	32·47	11·85	18·58	Fort Tigne and Hutments, 12 months ...	1

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In the Command.	Of Invalids.	Total.			Admitted.	Died.	Invalided.	Constantly Sick.				
													days.	days.		
	China—*cont.*															
	Garrison Staff and Departments.	52	46	—	—	—	5	2·49	884·6	—	96·15	47·88	17·47	19·75	Hong Kong, 12 months	Various.
	Grand Total	1,417	2,973	10	1	11	73	162·07	2098·1	7·76	51·51	114·38	41·75	19·90		
	Straits Settlements.															
	Royal Artillery.															
25th	Southern Division...	126	178	—	—	—	4	12·63	1412·7	—	31·75	100·24	36·59	25·90	Fort Canning and Blakan Mati, 12 months.	3
38th	Southern Division...	130	220	2	—	2	2	13·03	1692·3	15·38	15·38	100·23	36·58	21·62	Fort Canning, Pulo Brani, and Tanglin, 12 months.	
	Total	256	398	2	—	2	6	25·66	1554·7	7·81	23·44	100·23	36·59	23·53		
	Royal Engineers.	88	37	—	—	—	—	1·91	420·5	—	—	21·70	7·92	18·84	Various	Various.
	Infantry Regiments.															
1st	Northumberland Fusiliers ...	—	—	—	1	1	—	—	—	—	—	—	—	—	Battalion left for England in November, 1896.	—
1st	Rifle Brigade	970	907	6	—	6	9	61·63	935·1	6·19	9·28	63·54	23·19	24·80	Fort Canning, Penang, and Tanglin, 12 months.	1
	Garrison Staff and Departments.	38	15	—	—	—	—	·61	394·7	—	—	16·05	5·86	14·84	Fort Canning, Penang, and Tanglin, 12 months.	Various.
	Grand Total	1,352	1,357	8	1	9	15	89·81	1003·7	6·66	11·09	66·43	24·25	24·16		

	EGYPT AND CYPRUS.															
	Cavalry.															
2nd	Dragoon Guards	—	—	—	—	—	1	·21	—	—	—	—	—	—	—	—
21st	Lancers	495	388	4	—	4	9	30·75	783·8	8·08	18·18	62·12	22·69	28·62	Abbassiyeh, 12 months	1
	Total	495	388	4	—	4	10	30·96	783·8	8·08	20·20	62·55	22·83	29·12		
	Royal Artillery.															
32nd	Field Battery	178	81	1	—	1	3	5·75	455·1	5·62	16·85	32·30	11·79	25·91	Abbassiyeh, 12 months	4
16th	Eastern Division	158	122	2	—	2	1	7·25	772·1	12·66	6·33	45·88	16·75	21·69	Alexandria and Cairo, 12 months ...	2
	Total	336	203	3	—	3	4	13·00	604·2	8·93	11·90	38·69	14·12	23·37		
	Royal Engineers.	122	41	2	—	2	—	2·64	336·1	16·39	—	21·64	7·90	23·50	Alexandria, Cairo, and Cyprus, 12 months.	3
	Infantry Regiments.															
1st	Royal Warwickshire Regiment...	856	778	7	—	7	3	64·26	908·9	8·18	3·50	75·67	27·40	30·15	Alexandria, 11 months. From Malta, 24th January.	—
1st	Lincolnshire Regiment	915	677	6	—	6	3	50·04	739·9	6·55	3·28	54·69	19·96	26·98	Cairo, 11 months. From Malta, 6th February.	—
1st	East Yorkshire Regiment ...	—	—	—	—	—	1	·12	—	—	—	—	—	—	—	—
1st	Gloucestershire Regiment ...	143	165	3	—	3	11	5·88	1153·1	20·98	76·92	39·02	14·24	12·34	Alexandria, 1 month. To India, 5th February.	2
1st	Royal Highlanders	—	1	—	—	—	1	·11	—	—	—	—	—	40·15	—	—
1st	North Staffordshire Regiment ...	799	570	9	—	9	4	44·13	713·4	11·26	5·01	55·23	20·16	28·26	Cairo, 9½ months. To India, 12th October.	1
1st	Cameron Highlanders	254	156	2	—	2	—	9·30	614·1	7·87	—	36·61	13·36	21·76	Cairo, 2½ months. From Gibraltar, 14th October.	—
1st	Connaught Rangers	98	84	—	—	—	13	9·98	857·1	—	132·65	101·84	37·17	43·37	Cairo, 1 month. To India, 26th January	1
	Mounted Infantry...	121	77	—	—	—	—	3·59	636·4	—	—	29·67	11·66	17·02	Abbassiyeh, 12 months	Various.
	Total	3,186	2,508	27	—	27	36	187·41	787·2	8·48	11·30	58·82	21·47	27·27		

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In the Command.	Of Invalids.	Total.			Admitted.	Died.	Invalided.	Constantly Sick.				
	Egypt and Cyprus *cont.*												days.	days.		
	Garrison Staff and Departments.															
	Army Service Corps	63	17	—	—	—	—	1·04	269·8	—	—	16·51	6·02	22·33	Various stations, 12 months	Various.
	Medical Staff Corps	111	47	—	—	—	1	3·82	423·4	—	9·01	34·41	12·56	29·66	Various stations, 12 months	Various.
	Army Ordnance Corps	56	19	—	—	—	2	2·24	339·3	—	35·71	40·00	14·60	43·03	Various stations, 12 months	Various.
	Army Pay Corps	10	—	—	—	—	—	—	—	—	—	—	—	—	Various stations, 12 months	Various.
	Military Police	65	17	—	1	1	2	1·82	261·5	15·38	30·77	28·00	10·22	39·08	Various stations, 12 months	Various.
	General Staff	5	2	—	—	—	—	·02	400·0	—	—	4·00	1·46	3·65	Various stations, 12 months	Various.
	Total	310	102	—	1	1	5	8·94	329·0	3·23	16·13	28·84	10·53	31·99		
	Grand Total	4,449	3,242	36	1	37	55	242·95	728·7	8·31	12·36	54·61	19·93	27·35		

ABSTRACT No. XXVII.—TABLE, taken from the REPORT of the PRINCIPAL MEDICAL OFFICER, showing the ADMISSIONS, MORTALITY and INVALIDING in each CORPS serving in INDIA during the Year 1897.

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years of Service in India.
						Admissions into Hospital.	Deaths.	Invalids.	Average Daily Sick.				
CAVALRY.										days.	days.		Yrs. ms.
4th Dragoon Guards	572	845	22	13	42·38	1477·3	38·46	22·73	74·09	27·04	18·31	Rawal Pindi, 7½ months; Fort Jamrud 4½ months; Peshawar, ½ month. Dett. Camp Topa, 4½ months.	3 3
5th " "	582	928	11	22	71·63	1594·5	18·90	37·80	123·08	44·92	28·17	Meerut, 12 months; Dett. Chakrata, 8¾ months	4 2½
4th Hussars	473	700	8	35	56·92	1479·9	16·91	74·00	120·34	43·92	29·68	Bangalore, 12 months	1 3
5th Lancers	590	1,198	17	19	54·80	2030·5	28·81	32·20	92·88	33·90	16·70	Muttra, 12 months	9 0
9th "	25	43	—	—	2·68	1720·0	—	—	107·20	39·13	22·75	Sialkot, 2½ months (draft consisting of 130 men arrived from England 19th October).	9 0
11th Hussars	603	909	29	8	48·91	1507·5	48·09	13·27	81·11	29·61	19·64	Sialkot, 7½ months; Rawal Pindi, 4½ months; Dett. Peshawar, 2 months.	5 1
16th Lancers...	574	688	8	15	47·21	1198·6	13·94	26·13	82·25	30·02	25·05	Umballa, 12 months	7 3
18th Hussars	565	744	12	17	59·35	1316·8	21·24	30·09	105·04	38·34	29·12	Lucknow, 12 months	8 0
19th "	568	725	4	25	54·06	1276·4	7·04	44·01	95·18	34·74	27·22	Secunderabad, 12 months	6 3
20th "	570	845	15	25	62·84	1482·5	26·32	43·86	110·25	40·24	27·14	Mhow, 12 months	2 3
Total	5,122	7,625	126	179	500·78	1488·7	24·60	34·95	97·77	35·69	23·97		

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In the Command	Of Invalids.	Total.			Admitted.	Died.	Invalided	Constantly Sick.				
	Bermuda—*cont.*															
	Garrison Staff and Departments—cont.												days.	days.		
	Army Ordnance Corps	37	10	—	—	—	1	·49	270·3	—	27·03	13·24	4·83	17·88	Various	Various.
	Garrison Staff	6	—	—	—	—	—	—	—	—	—	—	—	—	Various	Various.
	Total	74	18	—	—	—	1	1·11	243·2	—	13·51	15·00	5·47	22·51		
	Grand Total	1,521	687	16	1	17	16	40·64	451·7	11·18	10·52	26·72	9·75	21·59		
	West Indies.															
	Barbados, &c.															
	Royal Artillery.															
1st	Western Division	18	40	—	—	—	—	1·50	2222·2	—	—	83·33	30·42	13·69	Barbados and St. Lucia, 1¾ months. From Halifax, N.S., 8th November.	—
23rd	Western Division	125	173	2	—	2	4	11·90	1384·0	16·00	32·00	95·20	34·75	25·11	Barbados and St. Lucia, 10¼ months. To South Africa, 8th November.	3
	District Establishment	3	2	—	—	—	—	·18	666·7	—	—	60·00	21·90	32·85	St. Lucia, 12 months	3
	St. Lucia Company	3	—	—	—	—	—	—	—	—	—	—	—	—	St. Lucia, 12 months	Various.
	Total	149	215	2	—	2	4	13·58	1442·9	13·42	26·85	91·14	33·27	23·05		
	Royal Engineers.	15	3	—	—	—	—	·08	200·0	—	—	5·33	1·95	9·73	Barbados and St. Lucia, 12 months ...	Various.

	Infantry Regiments.															
1st	Liverpool Regiment	508	914	1	—	1	23	61·74	1799·2	1·97	45·28	121·54	44·36	24·66	Barbados and St. Lucia, 10¼ months. To South Africa, 8th November.	2
1st	Royal Berkshire Regiment ..	57	96	—	—	—	—	4·80	1684·2	—	—	84·21	30·74	18·25	Barbados and St. Lucia, 1¾ months. From Halifax, N.S., 8th November.	—
	West India Regiment	5	5	—	—	—	1	·24	1000·0	—	200·00	48·00	17·52	17·52	Barbados and St. Lucia, 10½ months. To West Africa, 16th November.	Various.
	Total	570	1,015	1	—	1	24	66·78	1780·7	1·75	42·11	117·16	42·76	24·01		
	Garrison Staff and Departments.	33	15	1	—	1	—	·60	454·5	30·30	—	18·18	6·64	14·60	Barbados and St. Lucia, 12 months.	Various.
	Total, Barbados, &c. ...	767	1,248	4	—	4	28	81·04	1627·1	5·23	36·50	105·66	38·56	23·70		
	JAMAICA.															
	Royal Artillery.															
22nd	Southern Division...	26	18	1	—	1	—	1·01	692·3	38·46	—	38·84	14·18	20·48	Newcastle and Port Royal, 1¾ months. From Malta, 11th November.	—
14th	Western Division	123	115	—	1	1	2	7·86	935·0	8·13	16·26	63·90	23·22	24·94	Newcastle and Port Royal, 10¼ months. To South Africa, 12th November.	3
	Jamaica Company	3	—	—	—	—	—	—	—	—	—	—	—	—	Port Royal, 12 months	5
	Total	152	133	1	1	2	2	8·87	875·0	13·16	13·16	58·35	21·30	24·34		
	Royal Engineers.	42	24	4	—	4	—	1·13	571·4	95·24	—	26·90	9·82	17·18	Various	—
	Infantry Regiments.															
1st	Liverpool Regiment	292	272	2	—	2	11	22·21	934·9	6·85	37·67	76·06	27·76	29·80	Newcastle and Up Park Camp, 10¼ months. To South Africa, 12th November.	1
1st	Royal Berkshire Regiment ...	49	33	3	—	3	—	1·68	673·5	61·22	—	34·28	12·51	18·58	Newcastle and Up Park Camp, 1¾ months. From Halifax, N.S., 11th November.	—
	West India Regiment	14	9	—	—	—	—	·44	642·8	—	—	31·42	11·47	17·84	Up Park Camp	Various.
	Total	355	314	5	—	5	11	24·33	884·5	14·08	30·98	68·53	25·01	28·28		

Corps.	Average annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average sick time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years of Service in India.	
						Admissions into Hospital.	Deaths.	Invalids.	Average Daily Sick.				Yrs.	ms.
ARTILLERY.														
A Battery, R.H.A.	139	216	1	6	14·08	1554·0	7·19	43·17	101·29	36·97	23·79	Umballa, 7¾ months: Rawal Pindi, 2¼ months; Peshawar, 1¾ months, marching ¼ month.	8	2
B " "	166	240	2	4	15·03	1445·8	12·05	24·10	90·84	33·05	23·86	Lucknow, 10 months; Practice camp Hurha ½ month, marching 1½ months.	8	2
C " "	150	205	5	9	18·06	1366·7	33·33	60·00	120·40	43·95	32·16	Meerut, 12 months	8	2
F " "	146	272	8	1	12·20	1863·0	54·79	6·85	83·56	30·50	16·37	Sialkot, 6¼ months; Practice camp Muridki, 1 month; Peshawar, 2 months; Hari Sing-ka-Burj, 2¾ months.	2	3
H " "	149	200	2	4	12·75	1342·3	13·42	26·85	85·57	31·23	23·27	Umballa, 12 months	8	2
I " "	150	220	6	10	13·24	1466·7	40·00	66·67	88·27	32·22	21·97	Mhow, 19 months	4	2½
J " "	20	14	—	—	1·15	700·0	—	—	57·50	20·99	29·98	Bangalore, 1¾ months; (arrived from England 10th October).	0	2
K " "	149	179	8	3	5·83	1201·3	53·69	20·13	39·13	14·28	11·89	Rawal Pindi, 5¼ months; Fort Jamrud, 4½ months; marching, 2¼ months.	6	2
L " "	155	188	2	8	12·82	1212·9	12·90	51·61	82·71	30·19	24·89	Kirkee, 12 months	5	2
M " "	147	159	3	7	12·89	1081·6	20·41	47·62	87·69	32·01	29·59	Bangalore, 10¾ months; (left for England 21st November).	10	11
N " "	173	230	4	5	17·19	1329·5	23·12	28·90	99·36	36·27	27·28	Meerut, 12 months	12	1½
S " "	164	202	2	4	16·88	1231·7	12·20	24·39	102·93	37·57	30·50	Secunderabad, 12 months	12	0
1st Field Battery, R.A.	158	285	4	2	16·07	1487·3	25·32	12·66	101·71	37·12	24·96	Kirkee, 12 months	2	0
3rd " " "	99	133	2	—	9·58	1343·4	20·20	—	96·77	35·32	26·29	Saugor, 7½ months (on N.W. Frontier Field Service, 4½ months.)	1	3
5th " " "	146	109	4	4	8·28	746·6	27·40	27·40	56·71	20·70	27·73	Bangalore, 11½ months (left for England 16th December.)	14	0
6th " " "	145	216	4	5	13·24	1489·7	27·59	34·48	91·31	33·33	22·37	Dinapore, 10½ months, Practice camp Barkcha, ½ month; marching, 1 month.	6	2

9th ,, ,, ,, ...	111	104	2	8	5·96	936·9	18·02	72·07	53·69	10·60	20·92	Mian Mir, 8 months; Practice camp Muridki, ¾ month on N.W. Frontier Field Service, 2¾ months (left for Ireland 10th December).	14	1
10th ,, ,, ,, ...	91	103	2	2	6·95	1131·9	21·98	21·98	76·37	27·87	24·63	Rawal Pindi, 7 months (on N.W. Frontier Field Service; 5 months).	13	2
11th ,, ,, ,, ...	13	23	—	—	·49	1769·2	—	—	37·69	13·76	7·78	Mian Mir, 1 month (arrived from England 29th Novembe).	0	1
15th ,, ,, ,, ...	153	165	3	4	11·52	1078·4	19·61	26·14	75·29	27·48	25·43	Meerut, 11 months; marching, 1 month	10	0
16th ,, ,, ,, ...	145	214	1	3	14·26	1475·9	6·90	20·69	98·34	35·90	24·32	Kirkee, 12 months	1	11
17th ,, ,, ,, ...	138	283	3	6	19·30	2050·7	21·74	43·48	143·48	52·37	25·54	Jubbulpore 10⅔ months (left for England 20th November).	14	1
21st ,, ,, ,, ...	153	159	2	11	11·91	1039·2	13·07	71·90	77·84	28·41	27·34	Bangalore, 12 months	12	0
22nd ,, ,, ,, ...	140	223	2	5	14·01	1592·9	14·29	35·71	100·07	36·53	22·93	Mhow, 12 months	11	0
23rd ,, ,, ,, ...	168	243	5	3	11·87	1446·4	29·76	17·86	70·65	25·79	17·83	St. Thomas Mt., 11 months; Secunderabad, 1 month ...	6	2
24th ,, ,, ,, ...	151	203	2	3	14·89	1344·4	13·25	19·87	98·61	35·99	26·77	Agra, 10½ months; Practice camp, Palipahari ½ month; marching, 1 month.	7	2
25th ,, ,, ,, ...	14	15	—	—	·49	1071·4	—	—	35·00	12·77	11·92	Bangalore, 1 month (arrived from England 26th November).	0	1
26th ,, ,, ,, ...	147	249	2	2	17·18	1693·9	13·61	13·61	116·87	42·66	25·18	Kamptee, 12 months	14	2
27th ,, ,, ,, ...	145	228	9	7	14·26	1572·4	62·07	48·28	98·34	35·90	22·83	Nasirabad, 11 months; marching, 1 month	10	2
29th ,, ,, ,, ...	150	166	1	7	9·51	1106·7	6·67	46·67	63·40	23·14	20·91	Belgaum, 12 months	4	2
30th ,, ,, ,, ...	146	271	6	2	18·03	1856·2	41·10	13·70	123·49	45·08	24·28	Fyzabad, 9 months; Lucknow, 2½ months; Practice camp, Hurha, ½ month.	1	2
31st ,, ,, ,, ...	158	248	5	5	10·49	1569·6	31·65	31·65	66·39	24·23	15·44	Mian Mir, 10½ months; Practice camp, Muridki, ½ month; marching, 1 month.	9	2
33rd ,, ,, ,, ...	154	152	2	7	12·89	987·0	12·99	45·45	83·70	30·55	30·95	Secunderabad, 12 months	6	2
34th ,, ,, ,, ...	157	183	4	7	14·99	1165·6	25·48	44·59	95·48	34·85	29·90	Meerut, 11 months; marching, 1 month	7	2
35th ,, ,, ,, ...	149	253	4	4	15·09	1698·0	26·85	26·85	101·28	36·97	21·77	Deesa, 11¼ months; marching, ¾ month	9	2
36th ,, ,, ,, ...	146	405	2	9	18·50	2774·0	13·70	61·64	126·71	46·25	16·67	Neemuch, 11¼ months; marching, ¾ month	10	2
40th ,, ,, ,, ...	147	168	3	4	10·20	1142·9	20·41	27·21	69·39	25·23	22·16	Ahmednagar, 12 months	4	2½

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In Command.	Of Invalids.	Total.			Admitted.	Died.	Invalids.	Constantly Sick.				
	Mauritius.												days.	days.		
	Royal Artillery.															
24th	Western Division	114	189	1	—	1	12	11·08	1657·3	8·77	106·26	97·19	35·47	21·40	Curepipe and Port Louis, 12 months. To Malta, 28th December.	3
26th	Western Division	1	2	—	—	—	—	·14	—	—	—	—	—	—	Curepipe and Port Louis. From South Africa, 27th December.	—
	District Staff, etc....	9	6	—	—	—	—	·18	666·6	—	—	20·00	7·30	10·95	Port Louis, 12 months	—
	Total	124	197	1	—	1	12	11·40	1588·7	8·06	96·77	91·93	33·57	21·12		
	Royal Engineers.	72	52	1	—	1	4	4·64	722·2	13·88	55·55	64·30	23·52	32·56	Curepipe and Port Louis, 12 months ...	—
	Infantry Regiments.															
2nd	York and Lancaster Regiment ...	63	73	—	1	1	2	6·29	1158·7	15·87	31·74	99·84	36·44	31·45	Curepipe and Port Louis, 1 month. To India, 2nd February.	—
1st	King's Royal Rifle Corps ...	469	553	4	—	4	20	38·07	1179·1	8·53	42·64	81·17	29·63	25·13	Curepipe and Port Louis, 11½ months. From India, 18th January.	—
	Total	532	626	4	1	5	22	44·36	1176·7	9·40	41·35	83·38	30·43	25·86		
	Garrison Staff and Departments.	28	6	—	—	—	—	·20	214·3	—	—	7·14	2·60	12·16	Curepipe and Port Louis, 12 months ...	—
	Grand Total	756	881	6	1	7	38	60·60	1165·3	9·26	50·26	80·16	29·26	25·10		

	CEYLON.															
	Royal Artillery.															
6th	**Southern Division... ... ...**	119	56	1	—	1	—	2·35	470·6	8·40	—	19·75	7·21	15·31	**Trincomali, 12 months ... ...**	2
37th	**Southern Division... ... ...**	122	104	1	—	1	2	7·29	852·5	8·20	16·39	60·57	22·11	25·94	**Colombo, 12 months ... ...**	2
	Total	241	160	2	—	2	2	9·74	663·9	8·30	8·30	40·41	14·75	22·22		
	Royal Engineers.	83	62	1	—	1	—	2·42	747·0	12·05	—	29·16	10·64	14·24	**Colombo and Trincomali, 12 months ...**	—
	Infantry Regiments.															
1st	**Loyal North Lancashire Regiment.**	960	1,211	4	1	5	12	62·91	1261·3	5·21	12·50	65·53	23·92	18·96	**Colombo, 12 months. Detachments at Kandy and Trincomali.**	1
1st	**West Yorkshire Regiment ...**	—	—	—	—	—	—	·24	—	—	—	—	—	—	**en route to Hong Kong ... ...**	—
	Total	960	1,211	4	1	5	12	63·15	1261·5	5·21	12·50	65·78	24·01	19·03		
	Garrison Staff and Departments.	40	10	—	—	—	—	·45	250·0	—	—	11·25	4·11	16·42	**Various ... ...**	**Various.**
	Grand Total	1,324	1,443	7	1	8	14	75·76	1089·9	6·04	10·57	57·22	20·89	19·16		
	CHINA.															
	Royal Artillery.															
12th	**Southern Division... ... ...**	109	193	1	—	1	11	11·86	1770·6	9·17	100·91	108·80	39·71	22·42	**Hong Kong, 12 months ... ...**	3
35th	**Southern Division... ... ...**	101	186	3	—	3	7	11·93	1841·5	29·70	69·30	118·11	43·11	23·41	**Hong Kong, 12 months ... ...**	3
	Total	210	379	4	—	4	18	23·79	1804·7	19·04	85·71	113·28	41·34	22·91		
	Royal Engineers.	160	148	4	—	4	9	7·04	925·0	25·00	56·25	44·00	16·06	17·36	**Hong Kong, 12 months ... ...**	**Various.**
	Infantry Regiments.															
1st	**Royal Lancaster Regiment ...**	17	36	—	—	—	—	1·14	2117·6	—	—	67·05	24·47	11·55	**Hong Kong, 6 days. From Malta, 26th December.**	—
1st	**West Yorkshire Regiment ...**	978	2,364	2	1	3	41	127·58	2417·1	3·07	41·92	130·44	47·61	19·69	**Hong Kong, 12 months ... ...**	1
1st	**Rifle Brigade ... ...**	—	—	—	—	—	—	·03	—	—	—	—	—	—	—	—
	Total	995	2,400	2	1	3	41	128·75	2412·0	3·01	41·20	129·39	47·22	19·58		

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In the Command.	Of Invalids.	Total.			Admitted.	Died.	Invalided.	Constantly Sick.				
													days.	days.		
	China—*cont.*															
	Garrison Staff and Departments.	52	46	—	—	—	5	2·49	884·6	—	96·15	47·88	17·47	19·75	Hong Kong, 12 months	Various.
	Grand Total	1,417	2,973	10	1	11	73	162·07	2098·1	7·76	51·51	114·38	41·75	19·90		
	Straits Settlements.															
	Royal Artillery.															
25th	Southern Division...	126	178	—	—	—	4	12·63	1412·7	—	31·75	100·24	36·59	25·90	Fort Canning and Blakan Mati, 12 months.	3
38th	Southern Division...	130	220	2	—	2	2	13·03	1692·3	15·38	15·38	100·23	36·58	21·62	Fort Canning, Pulo Brani, and Tanglin, 12 months.	
	Total	256	398	2	—	2	6	25·66	1554·7	7·81	23·44	100·23	36·59	23·53		
	Royal Engineers.	88	37	—	—	—	—	1·91	420·5	—	—	21·70	7·92	18·84	Various	Various.
	Infantry Regiments.															
1st	Northumberland Fusiliers ...	—	—	—	1	1	—	—	—	—	—	—	—	—	Battalion left for England in November, 1896.	—
1st	Rifle Brigade	970	907	6	—	6	9	61·63	935·1	6·19	9·28	63·54	23·19	24·80	Fort Canning, Penang, and Tanglin, 12 months.	1
	Garrison Staff and Departments.	38	15	—	—	—	—	·61	394·7	—	—	16·05	5·86	14·84	Fort Canning, Penang, and Tanglin, 12 months.	Various.
	Grand Total	1,352	1,357	8	1	9	15	89·81	1003·7	6·66	11·09	66·43	24·25	24·16		

	EGYPT AND CYPRUS.															
	Cavalry.															
2nd	Dragoon Guards	—	—	—	—	—	1	·21	—	—	—	—	—	—	—	—
21st	Lancers	495	388	4	—	4	9	30·75	783·8	8·08	18·18	62·12	22·69	28·62	Abbassiyeh, 12 months	1
	Total	495	388	4	—	4	10	30·96	783·8	8·08	20·20	62·55	22·83	29·12		
	Royal Artillery.															
32nd	Field Battery	178	81	1	—	1	3	5·75	455·1	5·62	16·85	32·30	11·79	25·91	Abbassiyeh, 12 months	4
16th	Eastern Division	158	122	2	—	2	1	7·25	772·1	12·66	6·33	45·88	16·75	21·69	Alexandria and Cairo, 12 months ...	2
	Total	336	203	3	—	3	4	13·00	604·2	8·93	11·90	38·69	14·12	23·37		
	Royal Engineers.	122	41	2	—	2	—	2·64	336·1	16·39	—	21·64	7·90	23·50	Alexandria, Cairo, and Cyprus, 12 months.	3
	Infantry Regiments.															
1st	Royal Warwickshire Regiment...	856	778	7	—	7	3	64·26	908·9	8·18	3·50	75·67	27·40	30·15	Alexandria, 11 months. From Malta, 24th January.	—
1st	Lincolnshire Regiment	915	677	6	—	6	3	50·04	739·9	6·55	3·28	54·69	19·96	26·98	Cairo, 11 months. From Malta, 6th February.	—
1st	East Yorkshire Regiment ...	—	—	—	—	—	1	·12	—	—	—	—	—	—	—	—
1st	Gloucestershire Regiment ...	143	165	3	—	3	11	5·88	1153·1	20·98	76·92	39·02	14·24	12·34	Alexandria, 1 month. To India, 5th February.	2
1st	Royal Highlanders	—	1	—	—	—	1	·11	—	—	—	—	—	40·15	—	—
1st	North Staffordshire Regiment ...	799	570	9	—	9	4	44·13	713·4	11·26	5·01	55·23	20·16	28·26	Cairo, 9½ months. To India, 12th October.	1
1st	Cameron Highlanders	254	156	2	—	2	—	9·30	614·1	7·87	—	36·61	13·36	21·76	Cairo, 2½ months. From Gibraltar, 14th October.	—
1st	Connaught Rangers	98	84	—	—	—	13	9·98	857·1	—	132·65	101·84	37·17	43·37	Cairo, 1 month. To India, 26th January	1
	Mounted Infantry...	121	77	—	—	—	—	3·59	636·4	—	—	29·67	11·66	17·02	Abbassiyeh, 12 months	Various.
	Total	3,186	2,508	27	—	27	36	187·41	787·2	8·48	11·30	58·82	21·47	27·27		

Battery, Company, or Battn.	Corps and Commands.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalids sent Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Completed Years of Service in Command.
				In the Command.	Of Invalids.	Total.			Admitted.	Died.	Invalided.	Constantly Sick.				
	Egypt and Cyprus—*cont.*												days.	days.		
	Garrison Staff and Departments.															
	Army Service Corps	63	17	—	—	—	—	1·04	269·8	—	—	16·51	6·02	22·33	**Various stations, 12 months ... ...**	**Various.**
	Medical Staff Corps	111	47	—	—	—	1	3·82	423·4	—	9·01	34·41	12·56	29·66	**Various stations, 12 months ... ...**	**Various.**
	Army Ordnance Corps	56	19	—	—	—	2	2·24	339·3	—	35·71	40·00	14·60	43·03	**Various stations, 12 months ... ...**	**Various.**
	Army Pay Corps	10	—	—	—	—	—	—	—	—	—	—	—	—	**Various stations, 12 months ... ...**	**Various.**
	Military Police	65	17	—	1	1	2	1·82	261·5	15·38	30·77	28·00	10·22	39·08	**Various stations, 12 months ... ...**	**Various.**
	General Staff	5	2	—	—	—	—	·02	400·0	—	—	4·00	1·46	3·65	**Various stations, 12 months ... ...**	**Various.**
	Total	310	102	—	1	1	5	8·94	329·0	3·23	16·13	28·84	10·53	31·99		
	Grand Total	4,449	3,242	36	1	37	55	242·95	728·7	8·31	12·36	54·61	19·93	27·35		

ABSTRACT No. XXVII.—TABLE, taken from the REPORT of the PRINCIPAL MEDICAL OFFICER, showing the ADMISSIONS, MORTALITY and INVALIDING in each CORPS serving in INDIA during the Year 1897.

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength. Admissions into Hospital.	Deaths.	Invalids.	Average Daily Sick.	Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years of Service in India.
CAVALRY.										days.	days.		Yrs. ms.
4th Dragoon Guards	572	845	22	13	42·38	1477·3	38·46	22·73	74·09	27·04	18·31	Rawal Pindi, 7½ months; Fort Jamrud 4⅓ months; Peshawar, ⅙ month. Dett. Camp Topa, 4½ months.	3 3
5th " "	582	928	11	22	71·63	1594·5	18·90	37·80	123·08	44·92	28·17	Meerut, 12 months; Dett. Chakrata, 8¾ months	4 2½
4th Hussars	473	700	8	35	56·92	1479·9	16·91	74·00	120·34	43·92	29·68	Bangalore, 12 months	1 3
5th Lancers	590	1,198	17	19	54·80	2030·5	28·81	32·20	92·88	33·90	16·70	Muttra, 12 months	9 0
9th "	25	43	—	—	2·68	1720·0	—	—	107·20	39·13	22·75	Sialkot, 2½ months (draft consisting of 130 men arrived from England 19th October).	9 0
11th Hussars	603	909	29	8	48·91	1507·5	48·09	13·27	81·11	29·61	19·64	Sialkot, 7½ months; Rawal Pindi, 4½ months; Dett. Peshawar, 2 months.	5 1
16th Lancers...	574	688	8	15	47·21	1198·6	13·94	26·13	82·25	30·02	25·05	Umballa, 12 months	7 3
18th Hussars	565	744	12	17	59·35	1316·8	21·24	30·09	105·04	38·34	29·12	Lucknow, 12 months	8 0
19th "	568	725	4	25	54·06	1276·4	7·04	44·01	95·18	34·74	27·22	Secunderabad, 12 months	6 3
20th "	570	845	15	25	62·84	1482·5	26·32	43·86	110·25	40·24	27·14	Mhow, 12 months	2 3
Total	5,122	7,625	126	179	500·78	1488·7	24·60	34·95	97·77	35·69	23·97		

Corps.	Average annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Daily Average Sick.	Ratio per 1,000 of Strength.				Average sick time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years of Service in India.	
						Admissions into Hospital.	Deaths.	Invalids.	Average Daily Sick.				Yrs.	ms.
Artillery.														
A Battery, R.H.A.	139	216	1	6	14·08	1554·0	7·19	43·17	101·29	36·97	23·79	Umballa, 7¾ months; Rawal Pindi, 2¼ months; Peshawar, 1¾ months, marching ¼ month.	8	2
B " "	166	240	2	4	15·03	1445·8	12·05	24·10	90·54	33·05	22·86	Lucknow, 10 months; Practice camp Hurha ½ month, marching 1½ months.	8	2
C " "	150	205	5	9	18·06	1366·7	33·33	60·00	120·40	43·95	32·16	Meerut, 12 months	8	2
F " "	146	272	8	1	12·20	1863·0	54·79	6·85	83·56	30·50	16·37	Sialkot, 6¾ months; Practice camp Muridki, 1 month; Peshawar, 2 months; Hari Sing-ka-Burj, 2½ months.	2	3
H " "	149	200	2	4	12·75	1342·3	13·42	26·85	85·57	31·23	23·27	Umballa, 12 months	8	2
I " "	150	220	6	10	13·24	1466·7	40·00	66·67	88·27	32·22	21·97	Mhow, 19 months	4	2½
J " "	20	14	—	—	1·15	700·0	—	—	57·50	20·99	29·98	Bangalore, 1¾ months; (arrived from England 10th October).	0	2
K " "	149	179	8	3	5·83	1201·3	53·69	20·13	39·13	14·28	11·89	Rawal Pindi, 5½ months; Fort Jamrud, 4¾ months: marching, 2¼ months.	6	2
L " "	155	188	2	8	12·82	1212·9	12·90	51·61	82·71	30·19	24·89	Kirkee, 12 months	5	2
M " "	147	159	3	7	12·89	1081·6	20·41	47·62	87·69	32·01	29·59	Bangalore, 10¾ months; (left for England 21st November).	10	11
N " "	173	230	4	5	17·19	1329·5	23·12	28·90	99·36	36·27	27·28	Meerut, 12 months	12	1½
S " "	164	202	2	4	16·88	1231·7	12·20	24·39	102·93	37·57	30·50	Secunderabad, 12 months	12	0
1st Field Battery, R.A.	158	235	4	2	16·07	1487·3	25·32	12·66	101·71	37·12	24·96	Kirkee, 12 months	2	0
3rd " " "	99	133	2	—	9·58	1343·4	20·20	—	96·77	35·32	26·29	Saugor, 7¼ months (on N.W. Frontier Field Service, 4¾ months.)	1	3
5th " " "	146	109	4	4	8·28	746·6	27·40	27·40	56·71	20·70	27·73	Bangalore, 11½ months (left for England 16th December.)	14	0
6th " " "	145	216	4	5	13·24	1489·7	27·59	34·48	91·31	33·33	22·37	Dinapore, 10¼ months, Practice camp Barkcha, ¾ month; marching, 1 month.	6	2

9th ,, ,, ,, ...	111	104	2	8	5·96	936·9	18·02	72·07	53·69	19·60	20·92	Mian Mir, 8 months; Practice camp Muridki, ¾ month on N.W. Frontier Field Service, 2¾ months (left for Ireland 10th December).	14	1
10th ,, ,, ,, ...	91	103	2	2	6·95	1131·9	21·98	21·98	76·37	27·87	24·03	Bawal Pindi, 7 months (on N.W. Frontier Field Service; 5 months).	13	2
11th ,, ,, ,, ...	13	23	—	—	·49	1760·2	—	—	37·69	13·76	7·78	Mian Mir, 1 month (arrived from England 29th Novembe).	0	1
15th ,, ,, ,, ...	153	165	3	4	11·52	1078·4	19·61	26·14	75·29	27·48	25·43	Meerut, 11 months; marching, 1 month	10	0
16th ,, ,, ,, ...	145	214	1	3	14·26	1475·9	6·90	20·69	98·34	35·90	24·32	Kirkee, 12 months	1	11
17th ,, ,, ,, ...	138	283	3	6	19·30	2050·7	21·74	43·48	143·48	52·37	25·54	Jubbulpore 10⅔ months (left for England 20th November).	14	1
21st ,, ,, ,, ...	153	159	2	11	11·91	1039·2	13·07	71·90	77·84	28·41	27·34	Bangalore, 12 months	12	0
22nd ,, ,, ,, ...	140	223	2	5	14·01	1592·9	14·29	35·71	100·07	36·53	22·93	Mhow, 12 months	11	0
23rd ,, ,, ,, ...	168	243	5	3	11·87	1446·4	29·76	17·86	70·65	25·79	17·83	St. Thomas Mt., 11 months; Secunderabad, 1 month ...	6	2
24th ,, ,, ,, ...	151	203	2	3	14·89	1344·4	13·25	19·87	98·61	35·99	26·77	Agra, 10½ months; Practice camp, Palipahari ½ month; marching, 1 month.	7	2
25th ,, ,, ,, ...	14	15	—	—	·49	1071·4	—	—	35·00	12·77	11·92	Bangalore, 1 month (arrived from England 26th November).	0	1
26th ,, ,, ,, ...	147	249	2	2	17·18	1693·9	13·61	13·61	116·87	42·66	25·18	Kamptee, 12 months	14	2
27th ,, ,, ,, ...	145	228	9	7	14·26	1572·4	62·07	48·28	98·34	35·90	22·83	Nasirabad, 11 months; marching, 1 month	10	2
29th ,, ,, ,, ...	150	166	1	7	9·51	1106·7	6·67	46·67	63·40	23·14	20·91	Belgaum, 12 months	4	2
30th ,, ,, ,, ...	146	271	6	2	18·03	1856·2	41·10	13·70	123·49	45·08	24·28	Fyzabad, 9 months; Lucknow, 2½ months; Practice camp, Hurha, ½ month.	1	2
31st ,, ,, ,, ...	158	248	5	5	10·49	1569·6	31·65	31·65	66·39	24·28	15·14	Mian Mir, 10½ months; Practice camp, Muridki, ½ month; marching, 1 month.	9	2
33rd ,, ,, ,, ...	154	152	2	7	12·89	987·0	12·99	45·45	83·70	30·55	30·95	Secunderabad, 12 months	6	2
34th ,, ,, ,, ...	157	183	4	7	14·99	1165·6	25·48	44·59	96·48	34·85	29·90	Meerut, 11 months; marching, 1 month	7	2
35th ,, ,, ,, ...	149	253	4	4	15·09	1698·0	26·85	26·85	101·28	36·97	21·77	Deesa, 11⅓ months; marching, ⅔ month	9	2
36th ,, ,, ,, ...	146	405	2	9	18·50	2774·0	13·70	61·64	126·71	46·25	16·67	Neemuch, 11⅓ months; marching, ⅔ month	10	2
40th ,, ,, ,, ...	147	168	3	4	10·20	1142·9	20·41	27·21	69·39	25·23	22·16	Ahmednagar, 12 months	4	2½

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the Year.	Years of Service in India.
						Admissions into Hospital.	Deaths.	Invalids.	Average Daily Sick.				
ARTILLERY—*cont.*										days.	days.		Yrs. ms.
41st Field Battery, R.A.	140	316	8	14	16·45	2257·1	57·14	100·00	117·50	42·89	19·00	Barrackpore, 10 months; Practice camp Barkacha, ½ month; marching, 1½ months.	2 2½
42nd ,, ,, ,, ...	155	174	4	5	17·18	1122·6	25·81	32·26	110·84	40·46	36·04	Secunderabad, 12 months	11 0
45th ,, ,, ,, ...	161	221	1	7	17·74	1372·7	6·21	43·48	110·19	40·22	29·30	Bellary, 12 months	4 2
46th ,, ,, ,, ...	157	263	1	10	16·56	1675·2	6·40	63·69	105·48	38·50	22·98	Cawnpore, 11½ months; Practice camp, Hurha, ½ month	7 2
47th ,, ,, ,, ...	153	210	2	3	12·12	1372·5	13·07	19·61	79·22	28·91	21·07	Hyderabad, 11½ months; marching, ½ month	6 1
48th ,, ,, ,, ...	144	212	2	13	11·60	1472·2	18·89	90·28	80·56	29·40	19·97	Bareilly, 10 months; Camp Barkacha, ½ month; marching, 1½ months.	10 2
49th ,, ,, ,, ...	156	180	5	2	10·95	1153·8	32·05	12·82	70·19	25·62	22·20	St. Thomas Mt., 12 months	6 2
50th ,, ,, ,, ...	151	241	4	2	15·38	1596·0	26·49	13·25	101·85	37·18	23·29	Jullundur, 7 months; Rawal Pindi, 5 months	11 0
51st ,, ,, ,, ...	146	321	6	1	23·10	2198·6	41·10	6·85	158·22	57·75	26·27	Peshawar, 9 months; marching 3 months...	7 2
52nd ,, ,, ,, ...	22	43	—	—	2·27	1954·5	—	—	103·18	37·66	19·27	Jubbulpore, 1¾ months (arrived from England 9th November).	0 2
53rd ,, ,, ,, ...	161	450	1	3	15·74	2795·0	6·21	18·63	97·76	35·68	12·77	Karachi, 12 months	11 10½
54th ,, ,, ,, ...	150	223	2	5	14·71	1486·7	13·33	33·33	98·07	35·79	24·08	Allahabad, 10¾ months; Practice camp, Barkacha, ¾ months; marching, ½ month.	7 2
55th ,, ,, ,, ...	140	404	5	14	20·18	2885·7	35·71	100·00	144·14	52·61	18·23	Ahmedabad, 11 months; marching, 1 month	9 2
57th ,, ,, ,, ...	102	176	4	1	11·55	1725·5	39·22	9·80	113·24	41·33	23·95	Campbellpore, 7⅓ months; Peshawar, ⅓ month. (On N.W. frontier field service, 4⅓ months).	1 1
59th ,, ,, ,, ...	156	398	5	8	23·05	2551·3	32·05	51·28	147·76	53·93	21·14	Nowgong, 11 months; Practice camp, Pallpahari, ½ months; marching, ½ month.	13 2
60th ,, ,, ,, ...	159	271	—	1	14·65	1704·4	—	6·29	92·14	33·63	19·73	Multan, 10½ months; marching, 1½ months	11 0

70th Field Battery, R.A. ...	156	184		2	14·86	1179·5	19·23	12·82	95·19	34·75	29·46	Lucknow, 11¾ months; Practice camp, Hurha, ¼ month	11	1½
71st " " " ...	156	202		2	12·47	1294·9	6·41	12·82	79·94	29·18	22·53	Ferozepore, 11 months; Practice camp Muridki, 1 month.	10	0
72nd " " " ...	151	221		3	15·33	1463·6	6·62	19·87	101·52	37·06	25·32	Kirkee, 12 months	9	2
80th " " " ...	142	379	14	10	31·55	2669·0	98·59	70·42	222·18	81·10	30·38	Jhansi, 11½ months; Practice camp, Palipahari, ½ months	1	1½
No. 1 Mountain Battery, R.A. ...	59	86		2	4·29	1457·6	16·95	33·90	72·71	26·54	18·21	Rawal Pindi, 3 months: Khyra Gali, 3 months; marching, 1 month (on N.W. frontier field service, 5 months).	14	2
" 2 " " " ...	110	123	1	2	10·74	1118·2	9·09	18·18	97·64	35·64	31·87	Quetta, 12 months	11	11
" 3 " " " ...	76	76	2	6	4·49	1000·0	26·32	78·95	59·08	21·56	21·56	Jutogh, 5½ months; Fort Jamrud, ¾ month; marching, 2 months; (on N.W. Frontier Field Service, 3¾ months).	19	1
No. 5 " " " ...	89	103	2	2	7·25	1157·3	22·47	22·47	81·46	29·73	25·69	Rawal Pindi, 6 months; Kala Bagh, 5½ months; marching, ½ month.	19	1
" 6 " " " ...	66	109	1	7	7·15	1651·5	15·15	106·06	108·33	39·54	23·94	Mandalay, 9¼ months; Maymyo, 2 months; Lamaing, ¾ month.	12	2
" 7 " " " ...	56	46	2		3·56	821·4	35·71	—	63·57	23·20	28·25	Rawal Pindi, 3¼ months; Bara Gali, 3 months; marching, ¾ month; (on N.W. Frontier Field Service, 5 months).	11	10
" 8 " " " ...	74	80		2	4·76	1081·1	13·51	27·03	64·32	23·48	21·72	Jutogh, 6¾ months; marching, 2¼ months; (on N.W. Frontier Field Service, 3 months).	10	2
" 9 " " " ...	76	54	2	5	5·06	710·5	26·32	65·79	66·58	24·30	34·20	Darjeeling, 7 months; Practice camp, Bagdogra, 1¼ months; (on N.W. Frontier Field Service, 3¾ months).	13	2
No. 1 Co., Eastern Div., R.A. ...	127	189	1	9	12·02	1488·2	7·87	70·87	94·65	34·55	23·21	Fort Fulta, 1 month; Calcutta, 11 months	9	0
" 3 " " ...	129	121	2	3	7·99	938·0	15·50	23·26	61·94	22·61	24·10	Bombay, 9½ months; Rangoon, 2 months; sea voyage, ½ month.	3	2
" 4 " " ...	132	123		2	5·41	931·8	—	15·15	40·98	14·96	16·05	Madras, 9¼ months; Karachi, 2¼ months; marching, ½ month.	9	0
" 8 " " ...	135	265	2	7	12·31	1963·0	14·81	51·85	91·19	33·28	16·96	Delhi, 11½ months; Bombay, ½ month	10	2
" 9 " " ...	125	254		5	13·80	2032·0	8·00	40·00	110·40	40·30	19·83	Fort Chingrikhal, 1 month; Fort Allahabad, 11 months	2	0
" 12 " " ...	90	99	2	1	6·69	1100·0	22·22	11·11	74·33	27·13	24·67	Campbellpore, 12 months	3	0
" 13 " " ...	145	139		14	6·91	958·6	6·90	96·55	47·66	17·39	18·14	Aden, 12 months	11	1½
" 24 " " ...	125	142	1	3	9·35	1136·0	8·00	24·00	74·80	27·30	24·03	Bombay, 12 months	3	0
" 26 " " ...	138	181	—	9	16·78	1311·6	—	65·22	121·59	44·38	33·84	Roorkee, 1½ months; Practice camp, Pur, ¾ month; Aden, 9¼ months; marching, ½ months.	3	2
No. 5 Co., Southern Div., R.A. ...	130	253	4	2	17·76	1946·2	30·77	15·38	136·62	49·86	25·62	Agra, 11½ months; Bombay, ¼ month; marching, ¼ month.	10	2
" 7 " " ...	131	164	1	5	15·68	1251·9	7·63	38·17	119·69	43·69	34·90	Quetta, 12 months	12	1½

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the year.	Years of Service in India.	
						Admissions into Hospital.	Deaths.	Invalids.	Average Daily Sick.					
ARTILLERY—*cont.*										days.	days.		Yrs.	ms.
No. 9 Co., Southern Div., R.A....	130	168	1	5	10·76	1292·3	7·69	38·46	82·77	30·21	23·38	Aden, 2¾ months; Roorkee, 8¾ months; marching, ½ month.	10	2
„ 11 „ „ ...	124	143	3	10	13·26	1153·2	24·19	80·65	106·94	39·03	33·85	Rangoon, 12 months	8	1½
„ 18 „ „ ...	122	226	3	7	13·87	1852·5	24·59	57·38	113·69	41·50	22·40	Karachi, 2 months; Ferozepore, 10 months	8	1¼
„ 21 „ „ ...	153	110	1	9	11·12	719·0	6·54	58·82	72·68	26·53	36·90	Aden, 12 months	8	1½
„ 23 „ „ ...	133	151	2	5	9·77	1135·3	15·04	37·59	73·46	26·81	23·62	Bombay, 12 months	3	3
„ 24 „ „ ...	90	135	2	1	7·73	1500·0	22·22	11·11	85·89	31·35	20·90	Multan, 11¼ months; marching, ¾ month	10	2
„ 28 „ „ ...	137	166	1	2	15·29	1211·7	7·30	14·60	111·61	40·74	33·62	Quetta, 12 months	14	2
„ 33 „ „ ...	127	171	5	2	12·82	1346·5	39·37	15·75	100·94	36·84	27·36	Rawal Pindi, 3½ months; Camp Thobba, 4½ months; Peshawar, 4⅓ months.	1	0½
„ 4 Co., Western Div., R.A. ...	137	146	—	7	11·87	1065·7	—	51·09	86·64	31·62	29·67	Roorkee, 11 months; Practice camp, Pur, 1 month ...	3	2
„ 5 „ „ ...	121	182	1	3	11·78	1504·1	8·26	24·79	97·36	35·53	23·62	Fort Attock, 3½ months; Rawal Pindi, 8¾ months; Dett. Camp Thobba, 4 months.	5	2
„ 7 „ „ ...	91	85	2	3	7·30	934·1	21·98	32·97	80·22	29·28	31·35	Secunderabad, 12 months	3	2
„ 9 „ „ ...	84	169	3	6	13·35	2011·9	35·71	71·43	158·93	58·01	28·93	Jhansi, 11½ months; Practice camp, Palipahari, ½ month	3	2
„ 11 „ „ ...	130	143	—	2	4·89	1100·0	—	15·38	37·62	13·73	12·48	Karachi, 10 months; Madras, 2 months	10	2
„ 16 „ „ ...	126	300	7	6	13·38	2381·0	55·56	47·62	106·19	38·76	16·28	Barrackpore, 11 months; Fort Chingrikhal, 1 month ...	10	2
„ 18 „ „ ...	117	173	—	9	13·06	1478·6	—	76·92	111·62	40·74	27·55	Rangoon, 10½ months; Bombay, 1¼ months; sea voyage, ¼ month.	3	2
„ 22 „ „ ...	135	157	—	9	13·82	1163·0	—	66·67	102·37	37·37	32·13	Roorkee, 11½ months; Practice camp, Pur, ½ month ...	12	2½
Total ...	11,860	17,397	244	440	1126·08	1466·9	20·57	37·80	94·95	34·66	23·63			

ROYAL ENGINEERS.														
H Company, Royal Engineers ...	86	50	3	1	2·29	581·4	34·88	11·63	26·63	9·72	16·72	Fort Fulta, Roorkee; Bangalore, Rangoon, Bombay, and Kirkee.	30	0
INFANTRY.														
2nd Royal Scots	931	1,648	15	48	110·72	1770·1	16·11	51·56	118·93	43·41	24·52	Mandalay, 12 months	5	9
1st Royal West Surrey Regiment	704	902	14	17	70·71	1281·2	19·89	24·15	100·44	36·66	28·61	Umballa, 2¼ months; Dagshai, 4¼ months; Jullundur, ½ month; marching, ½ month; (on N.W. Frontier Field Service, 4½ months).	2	11
1st East Kent Regiment	649	895	27	37	62·80	1379·0	41·60	57·01	96·76	35·32	25·61	Peshawar, 4½ months; Cherat, 2½ months; (on N.W. Frontier Field Service, 5 months); Detts. Peshawar, 7¾ months; Cherat, 3 months.	10	9
1st Royal Fusiliers	940	1,672	20	29	111·99	1778·7	21·28	30·85	119·14	43·49	24·45	Mhow, 12 months; Detts. Neemuch, 3¾ months; Nasirabad, 3½ months; Indore, 12 months.	10	0
1st Norfolk Regiment	915	1,041	17	30	110·61	1684·2	18·58	32·79	120·89	44·12	26·20	Allahabad, 12 months; Detts. Cawnpore, 3½ months ...	8	10
1st Devonshire Regiment	755	1,082	11	18	76·47	1433·1	14·57	23·84	101·28	36·97	25·80	Peshawar, 2¾ months; Jullundur, 5¼ months; (on N.W. Frontier Field Service, 4 months); Wing Peshawar, 3½ months; Detts. Dalhousie, 12 months; Cherat, 1½ months.	5	0
2nd Suffolk Regiment	905	1,464	10	45	111·29	1617·7	11·05	49·72	122·97	44·88	27·75	Rangoon, 12 months; Dett. Port Blair, 12 months ...	6	10
1st Somersetshire Light Infantry	928	1,279	25	30	85·68	1378·2	26·94	32·33	92·31	33·69	24·45	Mian Mir, 7 months; Peshawar, 3¼ months; Rawal Pindi, ½ month; (on N.W. Frontier Field Service, 1¼ months; Detts. Cherat, 1 month; Dalhousie, 12 months; Fort Lahore, 7 months.	4	0
1st East Yorkshire Regiment ...	987	1,316	12	45	93·03	1333·3	12·16	45·59	94·26	34·40	25·80	Belgaum, 12 months; Detts. Ahmednagar, 7½ months; Satara, 5½ months.	2	1
1st Bedfordshire Regiment ...	966	1,951	22	20	119·34	2019·7	22·77	20·70	123·54	45·09	22·33	Umballa, 5 months; Solon, 4 months; Mian Mir, 3 months; Wings Ferozepore, 3 months; Umballa, 4 months; Mian Mir, 2 months; Detts. Dagshai, 4 months; Fort Lahore, 5 months.	7	0
2nd Royal Irish Regiment... ...	848	1,900	18	36	116·69	2240·6	21·23	42·45	137·61	50·23	22·42	Jubbulpore, 7¾ months; Rawal Pindi, 2½ months; (on N.W. Frontier Field Service, 1¾ months); Detts. Saugor, 12 months; Fort Attock, 2¾ months.	12	11

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the year.	Years of Service in India.
						Admissions into Hospital.	Deaths.	Invalids.	Average Daily Sick.				
INFANTRY—*cont.*										days.	days.		Yrs. ms.
2nd Yorkshire Regiment	769	1,268	9	43	89·41	1648·9	11·70	55·92	116·27	42·44	25·74	Bareilly, 2¼ months; Ranikhet, 5¼ months; Jullundur, 1 month; marching, ¼ month; (on N.W. Frontier Field Service, 3 month).	7 11
2nd Lancashire Fusiliers	919	1,238	13	13	110·59	1347·1	14·15	14·15	120·34	43·92	32·61	Quetta, 12 months	16 2
1st Royal Scots Fusiliers	777	1,077	14	13	68·68	1386·1	18·02	16·73	88·39	32·26	23·28	Sialkot, 7¾ months; (on N.W. Frontier Field Service, 4¼ months); Wing Ghora Dhaka, 2¾ months; Dett. Amritsar, 12 months.	1 2
1st Cheshire Regiment	930	1,487	14	36	119·29	1598·9	15·05	38·71	128·27	46·82	29·28	Secunderabad, 12 months; Dett. Wellington, 12 months	10 2
1st Royal Welsh Fusiliers	562	880	5	30	52·77	1565·8	8·90	53·38	93·90	34·27	21·89	Aden, 10¾ months; (left for England 21st November) ...	17 2¼
1st South Wales Borderers ...	36	81	—	—	1·98	2250·0	—	—	55·00	20·08	8·92	Meerut, ½ month; (arrived from Gibraltar 18th December).	0 0½
2nd King's Own Scottish Borderers.	789	897	7	22	62·02	1136·9	8·87	27·88	78·61	28·69	25·24	Rawal Pindi 6 months; Camp Gharial, 3¼ months; (on N.W. Frontier Field Service, 2¾ months); Dett. Cawnpore, 1 month; Fort Attock, 3 months.	7 11½
1st Scottish Rifles	942	1,539	8	53	106·12	1633·8	8·49	56·26	112·65	41·12	25·17	Shahjahanpur, 1½ months; Bareilly, 3¼ months; Chaubuttia, 6 months; Lucknow, 1 month; marching, ¼ month.	3 0
2nd Royal Inniskilling Fusiliers...	775	1,404	11	23	107·90	1811·6	14·19	29·68	139·23	50·82	28·05	Meerut, 2¾ months; Chakrata, 5 months; Ferozepore, 1 month; Peshawar, ½ month; marching, ¼ month; (on N.W. Frontier Field Service, 2½ months).	9 0
1st Gloucestershire Regiment ...	786	1,119	3	25	78·67	1423·7	3·82	31·81	100·09	36·53	25·66	Calcutta, 10 months; (arrived from Egypt 25th February); Dett. Dum Dum, 7 months.	0 10¼
1st East Lancashire Regiment ...	801	1,133	8	35	92·95	1414·5	9·99	43·70	116·04	42·36	29·94	Thayetmyo, 10¼ months; (left for England 9th November); Dett. Meiktila, 10¾ months.	17 9¾
2nd East Lancashire Regiment ...	160	329	2	—	13·27	2056·3	12·50	—	82·94	30·27	14·72	Lucknow, 2½ months; (arrived from Aldershot 15th October).	0 2½
1st East Surrey Regiment ...	959	2,117	27	47	167·48	2207·5	28·15	49·01	174·64	63·74	28·28	Jhansi, 12 months; Dett. Nowgong, 12 months; Agra, 2 months; Fatehgarh, 3¾ months.	12 11½

1st Duke of Cornwall's Light Infantry.	944	,199	13	27	95·17	1270·1	13·77	28·60	100·82	36·80	28·97	Lucknow, 8¾ months; Rawal Pindi, 3 months; (on N.W.) Frontier Field Service, ¼ month); Detts. Fatehgarh, 1¼ months; Cawnpore, 1¼ months; Ranikhet, 6 months.	9	10
2nd Border Regiment	976	947	10	17	68·83	970·3	10·25	17·42	70·52	25·74	26·53	Quetta, 12 months	7	10
2nd Royal Sussex Regiment ...	860	1,147	16	27	87·09	1303·4	18·18	30·68	98·97	36·12	27·71	Fyzabad, 9 months; Peshawar, 2¾ months; (on N.W. Frontier Field service, ¼ month); Wing Fort Jamrud, 2¼ months.	12	0
1st Hampshire Regiment	981	1,505	5	29	75·29	1534·1	5·10	29·56	76·75	28·01	18·26	Multan, 12 months; Dett. Dalhousie, 12 months ...	11	11
2nd South Staffordshire Regiment	1,022	1,027	9	24	70·68	1004·9	8·81	23·48	69·16	25·24	25·12	Wellington, 9½ months; Thayetmyo, 2 months; sea voyage, ½ month; Detts. Meiktila, 2 months; Malapuram, 12 months; Calicut, 12 months; Cannanore, 12 months.	2	2
1st Dorsetshire Regiment... ...	750	946	20	64	82·65	1261·3	26·67	85·33	110·20	40·22	31·89	Bangalore, 7½ months; Rawal Pindi, ¼ month; Peshawar, 1½ months; marching, ¼ month; (on N.W. Frontier Field Service, 2½ months); Dett. Cherat, 1 month.	4	3
2nd South Lancashire Regiment ...	900	1,807	12	14	106·53	2007·8	13·33	15·56	118·37	43·20	21·52	Kamptee, 12 months; Dett. Jubbulpore, 4½ months ...	2	10
2nd Welsh Regiment	875	1,544	13	53	117·62	1764·6	14·86	60·57	134·42	49·06	27·81	Bellary, 12 months; Wing Madras, 12 months	5	3
1st Royal Highlanders	972	1,098	14	29	88·88	1129·6	14·40	29·84	91·44	33·38	29·55	Umballa, 4½ months; Subathu, 7¼ months; marching, ¼ month; Dett. Jutogh, 9 months; Dagshai, 5 months.	1	10
2nd Oxfordshire Light Infantry...	725	1,204	10	51	81·03	1660·7	13·79	70·34	111·77	40·79	24·56	Bareilly, 1¼ months; Ferozepore, 6¾ months; Peshawar, ¾ month; (on N.W. Frontier Field Service, 3¼ months. Dett. Dalhousie, 12 months.	11	9
2nd Essex Regiment	916	1,038	18	28	76·50	1133·2	19·65	30·57	83·52	30·48	26·90	Lucknow, 11¼ months; Shwebo, ½ month; sea voyage, ¼ month; Dett. Ranikhet, 6 months.	5	2
2nd Derbyshire Regiment ...	746	1,157	11	35	80·43	1550·9	14·75	46·92	107·82	39·35	25·37	Sitapur, 1 month; Bareilly, 7¾ months; (on N.W. Frontier Field Service, 3¼ months); Wing Benares, 1 month; Dett. Ranikhet, 6 months.	15	2
1st Northamptonshire Regiment...	707	976	21	33	76·60	1380·5	29·70	46·68	108·35	39·55	28·65	Secunderabad, 7½ months; Rawal Pindi, ¾ month; Peshawar, ¼ month; marching, ¼ month; (on N.W. Frontier Field Service, 3¼ months).	5	2
1st Royal West Kent Regiment ...	621	927	24	13	72·62	1492·8	38·65	20·93	116·94	42·68	28·59	Meerut, 2 months; Peshawar, 5 months); (on N.W. Frontier Field Service, 5 months); Dett. Cherat, 5½ months. Delhi, 1½ months.	5	11
2nd King's Own Yorkshire Light Infantry.	898	1,619	21	40	95·88	1802·9	23·39	44·54	166·77	38·97	21·62	Nasirabad, 8¾ months; Umballa, ¼ month; Rawal Pindi, 2½ months; (on N.W. Frontier Field Service, ½ month); Detts. Neemuch, 8¾ month.	10	10
1st Shropshire Light Infantry ...	867	1,589	65	47	109·45	1832·8	74·97	54·21	126·24	46·08	25·14	Calcutta, 2 months; Sitapur, 10 months; Wing Benares, 11 months.	3	0

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.	Stations occupied during the year.	Years of Service in India.
						Admissions into Hospital.	Deaths.	Invalids.	Average daily sick.				
INFANTRY—*contd.*										days.	days.		Yrs. ms.
2nd Middlesex Regiment	948	1,661	13	25	90·84	1752·1	13·71	26·37	95·82	34·98	19·96	Ahmednagar, 4½ months; Bombay, 7½ months; Detts. Deesa, 7½ months: Satara, 4½ months; Kirkee, 4½ months; Ahmedabad, 7½ months; Deolali, 7½ months.	17 8½
1st Wiltshire Regiment	1 016	2,242	10	38	91·81	2206·7	9·84	37·40	90·36	32·98	14·95	Karachi, 12 months: Detts Hyderabad, 9½ months; Bangalore, 4½ months.	2 3
2nd Manchester Regiment ...	861	1,177	14	19	76·73	1367·0	16·26	22·07	89·12	32·53	23·79	Dinapore, 10 months; Aden, 1½ months; marching, ½ month: Dett. Darjeeling, 12 months.	15 2
1st North Staffordshire Regiment	161	205	8	--	9·76	1273·3	49·69	---	60·62	22·13	17·38	Umballa, 2 months; (arrived from Egypt, 1st November).	— 2
2nd York and Lancaster Regiment.	808	1,570	56	8	97·80	1943·1	69·31	9·90	121·04	44·18	22·74	Agra, 10½ months; (arrived from Mauritius and South Africa, 21st February).	— 10½
2nd Durham Light Infantry ...	890	1,132	7	49	73·13	1271·9	7·87	55·06	82·17	29·90	23·58	Poona, 12 months	11 0
2nd Highland Light Infantry ...	639	1,045	11	35	68·09	1635·4	17·21	54·77	106·56	38·89	23·78	Cawnpore, 7½ months; (on N.W. Frontier Field Service 4½ months) Dett. Fatehgarh; 7 months.	13 2
2nd Seaforth Highlanders ...	65	75	--	7	7·19	1153·8	---	107·69	110·62	40·37	34·99	Ferozepore, 1½ months; (left for England 12th February).	17 10
1st Gordon Highlanders	681	638	4	5	46·10	936·9	5·87	7·34	67·69	24·71	26·37	Rawal Pindi, 4½ months; Kuldana, 2½ months; Peshawar, ½ month; (on N.W. Frontier Field Service, 4½ months).	5 11½
2nd Royal Irish Rifles	904	1,269	9	28	77·36	1403·8	9·96	30·97	85·58	31·23	22·25	Poona, 12 months	3 1
1st Royal Irish Fusiliers	884	1,073	9	38	73·91	1213·8	10·18	42·99	83·61	30·52	25·14	Shwebo, 11½ months (left for Egypt, 10th December); Dett. Bhamo, 11½ months; Bernardmyo, 11½ months).	14 2
2nd Connaught Rangers	796	1,458	27	12	87·60	1831·7	33·92	15·08	110·05	40·17	21·93	Meerut, 10½ months; (arrived from Egypt, 18th February); Dett. Delhi, 10½ months.	10 0½
2nd Argyll and Sutherland Highlanders.	581	988	11	11	60·17	1700·5	18.93	18·93	103·56	37·80	22·23	Nowshera, 6 months: (on N.W. Frontier Field Service, 6 months); Dett. Fort Attock, 6 months; Cherat, 4 months.	6 0
2nd Royal Munster Fusiliers ...	925	1,430	25	37	77·15	1545·9	27·03	40·00	83·41	30·44	19·69	Dum Dum, 12 months; Detts. Barrackpore, 12 months; Dinapore, 2 months.	13 9

2nd Royal Dublin Fusiliers ...	368	571	4	28	34·84	1551·6	10·87	76·09	94·67	34·56	22·27	Bombay, 4½ months: (left for Malta, 19th May); Dett. Deesa, 4½ months; Ahmedabad, 4½ months.	11 2⅔
3rd Battalion Rifle Brigade ...	675	957	16	6	57·39	1417·8	23·70	8·89	85·02	31·03	21·89	Rawal Pindi, 6 months; Umballa, 1½ months; Marching, ½ month; (on N.W. Frontier Field Service, 4 months); Wing Camp Thobba, 6 months.	8 10
Total	43,715	67,440	818	1,572	4555·56	1542·7	18·71	35·96	104·21	38·04	24·66		
Garrison Staff and Departments	3 706	4,267	23	57	356·08	1151·4	6·21	15·38	96·08	35·07	36·46	Various.	
Men of various Corps marching	42	45	—	—	1·11	1071·4	—	—	26·43	9·65	9·00	Various.	
Grand Total	64,531	96,824	1,214	2,258	6541·90	1500·4	18·81	34·99	101·38	37·00	24·66		

APPENDICES.

APPENDIX No. I.

REPORT ON THE PROGRESS OF HYGIENE FOR THE YEAR 1898.

By Colonel J. LANE NOTTER, M.A., M.D., Royal Army Medical Corps
Professor of Military Hygiene at the Army Medical School, Netley.

The chief points of hygiene which have attracted attention during the year under review may be briefly summarised as follows :—

I.—*Legislation.*

The Reserve Forces and Militia Act enables Army Reservists of the first class up to the number of 5,000, to contract themselves into a liability to be called out for twelve months' permanent service, during the first twelve months of reserve service, and dispenses with the necessity which would otherwise arise under the Reserve Forces Act, 1882, of Parliament being summoned for the mere purpose of being informed of the step, but any exercise of this new power must be reported to Parliament as soon as may be. Only men of good character may agree to be liable to be called out, and they may revoke their agreements by three months' notice in writing. The same Act enables any part of the militia to make an offer, certified by their commanding officer, to serve in any place out of the United Kingdom.

The Inebriates Act enacts (1) That any habitual drunkard admitted by himself to be such, or found by the jury so to be, may, if he be convicted on indictment of an offence, and the Court is satisfied that the offence was committed under the influence of drink, or that drunkenness was a contributing cause of the offence, be ordered by the Court in addition to, or in substitution for, any other sentence, to be detained in any State or certified inebriate reformatory, the managers of which are willing to receive him, and, (2) that any habitual drunkard who is found drunk in any public place, or who commits any other of a long series of similar offences in which drunkenness is an ingredient, after having within twelve months been convicted at least three times of a similar offence, shall be liable upon conviction on indictment, or if he consents to be dealt with summarily, on summary conviction, to be similarly detained in any certified inebriate reformatory. State inebriate reformatories may be established by the Secretary of State, and paid for out of money provided by Parliament. Certified inebriate reformatories may be certified by the Secretary of State, on the application of any borough or county council or of any persons whatever if satisfied as to the fitness of the reformatory and of the persons proposing to maintain it. The Act also amends the Habitual Drunkards Act, 1879, in many particulars, the most important amendment being that which transfers the licensing of the existing "retreats" for the reception of habitual drunkards voluntarily seeking admission from the borough and county justices to the borough and county councils, and the extension of the *maximum* period of detention in a retreat from one year to two years. The Act applies both to Scotland and Ireland.

The Rivers Pollution Prevention Act enables joint committees of English and Scotch county councils of counties on either side of the border to exercise the powers of the Rivers Pollution Prevention Act, 1876, in relation to any river or tributary which is situate partly in England and partly in Scotland.

The Vaccination Act is founded on the recommendations of a Royal Commission which was appointed under Lord Herschell's chairmanship in 1889 and reported in 1896. This Act, while leaving compulsory vaccination undisturbed, is entirely devoted to meeting the objections to it in every possible way. The period within which a child must be vaccinated is extended from three months to six months from its birth, and the public vaccinator is directed to visit the child's home on request instead of the parent being required to take the child to the public vaccinator. In case of non-vaccination within four months from birth, the public vaccinator is directed to visit the home and to offer to vaccinate with glycerinated calf lymph or other lymph issued by the Local Government Board, the substitution of calf for child lymph putting a stop to the possible transmission of human diseases. The public vaccinator is not to operate in a house or district unsafe from a prevalence of infectious disease, and the Local Government Board may still provide vaccination stations in case of serious risk of small-pox or other exceptional circumstances. A list of patients is to be kept by the clerk of any sanitary authority maintaining a small-pox hospital, showing the condition of the patients as to vaccination, and such list is to be open to public inspection at a fee of sixpence for each search.

In addition to these provisions the Act contains three others directed to mitigating the penalties for disobedience, and one to preventing any penalties being inflicted in proved cases of conscientious belief that vaccination will be dangerous to a particular child. In mitigation it is enacted that the magisterial order directing vaccination, which under the Act 1867 might be made repeatedly until an unvaccinated child has reached the age of 14 years, is not to be made on any person convicted of non-compliance with a similar order relating to the same child; that no proceedings for disobedience to such an order shall be taken against any person who has been convicted for not having the same child vaccinated until it has reached the age of four years; and that persons committed to prison for non-compliance with any order under the Acts, or non-payment of fines or cost under them are to be treated as first-class misdemeanants.

As to prevention of penalties in particular cases, it is provided that no parent or other person having the custody of a child shall be liable to any penalty for non-vaccination or for disobedience of a magisterial order to have a child vaccinated if within four months from the birth of a child he satisfies two justices or a stipendiary or metropolitan police magistrate in petty sessions, that he conscientiously believes that vaccination would be prejudicial to the health of the child, and within seven days thereafter delivers to the vaccination officer for the district a certificate by such justices or magistrate of such conscientious objection.

This Section came into force on the passing of the Act—namely, on August 12th last.

II.—*Literature.*

The literature on sanitary science and public health work shows no signs of diminishing—many new books and papers have been added during the year under review. The following works have come under my notice:—

Epidemic Diphtheria: A research on the origin and spread of the disease from an International Standpoint. By A. Newsholme, M.D. London, 1898. This is an admirably worked out study of diphtheria statistics. The author contends that in diphtheria we have to deal with a disease which creeps slowly from place to place, in which months or even several years may elapse before it takes root and begins actively to propagate itself. Besides personal infection some other factor must be concerned in its spread. This other factor is believed by Dr. Newsholme to be essentially protracted drought, and he brings forward a great array of facts in support of this unexpected conclusion. On the vexed question of diphtheria and school attendance, Dr. Newsholme's views are sensible and moderate. His remarks on the antitoxin treatment are extremely interesting.

Researches on Tuberculosis. The Weber-Parkes Prize Essay, 1897. By Arthur Ransome, M.D., F.R.S. London: Smith, Elder, and Co., 1898.

In this prize essay Dr. Ransome gives a precise summary of the means, prophylactic and curative, by which tuberculosis can be best controlled. He shows that during the last 30 years there has been a steady diminution in the mortality from pulmonary tuberculosis in direct proportion to the improvement in general hygiene, but makes it clear that there has been no such diminution in tuberculous disease of other organs. He agrees with other observers as to the evil influence of damp soils. He shows that the virulence of the microbe is diminished by currents of air and sunlight, and that stagnant air charged with organic material may maintain the virulence for a long time after the bacillus has left the body. He believes that certain kinds of wall paper may serve as a medium on which the bacillus grows at the ordinary temperature of a dwelling-house. He finds chlorinated lime the best of all the fluid disinfectants. As regards the channels of infection Dr. Ransome considers the lungs and alimentary canal as the most frequent points of entry, and direct infection from the breath as the rarest of all the possible dangers. The establishment of a system of local notification, whereby the patient may be advised as to the disposal of his sputa and general hygienic surroundings, is shown to have been effectively practised, and its general adoption is advocated.

The Purification of Sewage and Water. By W. J. Dibdin, F.I.C., F.C.S. London: The Sanitary Publishing Co., Ltd., 1897.

This book will repay careful perusal. It is, however, somewhat disappointing that so much of the book should have been devoted to analytical details which can be found in any good work on chemical analysis. More complete information on the construction of filter tanks would have been welcome. Only eight chapters deal with the purification of sewage by living filters. The third chapter contains a valuable table of the results of the various precipitating processes in which lime is a factor. The next chapter deals with the well-known experiments of the Massachusetts Board of Health, the much larger experiments at Barking on ordinary London sewage and the working of the biological filters at Sutton. The Exeter septic tank of Mr. Cameron is described in the sixth chapter.

Report of an Investigation of the Epidemic of Malarial Fever or Kala-Azar in Assam. By L. Rogers, F.R.C.S., Surgeon-Captain I.M.S. Shillong. 1897.

Kala-Azar was investigated by Dr. Giles in 1890, who reported that the disease was essentially ankylostomiasis. Surgeon-Captain Rogers concludes that Kala-Azar is an intensified form of malarial fever. He found the malarial parasite in the blood in every case. It is to be regretted that a fuller description of this parasite has not been given. Until this is done it is impossible to feel quite certain that the Kala-Azar problem has been solved.

Lectures on the Theory and Practice of Vaccination. By Robert Cory, M.D. London: Ballière, Tindale, and Co., 1898.

This new work is worthy of perusal for what it contains and what it suggests. It was written before the final report of the Royal Commission on Vaccination, so it contains no reference to domiciliary vaccination, lymph, or deferment of the age to 6 or 12 months. Dr. Cory sees no need for change of practice so far as concerns the safety and efficiency of vaccination. Speaking of syphilis, he says, "Syphilitic children during the latent or incubatory period of the disease are not infective but become so immediately the symptoms declare themselves." Dr. Cory is strongly impressed with the evils attending small-pox hospitals in populous places. Since small-pox cases have been sent out of London there has been a remarkable fall in the yearly average number of deaths.

In Lecture VI the author argues that cow-pox and small-pox probably had their origin in human small-pox, and that the frequence of cow-pox in Jenner's time was due to the great prevalence of small-pox at that period.

Twenty-eighth Annual Report of the State Board of Health of Massachusetts Boston: Wright and Potter, 1897.

The period under report is the twelvemonth ending September, 1896, but with regard to water supply and sewerage the information is carried down to the end of the calendar year 1896. One of the most important duties of the Board is the control of water supplies and sewerage. Dr. Abbott gives a forty years' summary of national importance. Expressing the fecundity of marriage by the proportion existing between the children born in a given year and the marriages of five years previous, the unexpected result is obtained that during 1851-55 it was 2·8 children per marriage, while in 1886-90 it was 3·4 children per marriage.

The section dealing with the cause of death shows a decline in the death-rate of small-pox, scarlet fever, and diphtheria.

English Sanitary Institutions. By Sir John Simon, K.C.B. London: Smith, Elder, and Co., 1897.

This is the second edition of a book which has described the growth of our present sanitary system. Part I deals with Roman Institutions and Mediæval Philanthropy. Part II, Post-Mediæval England, shows the growth of the medical profession in Tudor times. Part III is most interesting to those who care to know the forces which brought about our Victorian sanitary legislation.

Sanitation in the British Mercantile Marine. By William G. Romeril. London: The Shipping World Co., Ltd., 1898.

The Shipmaster's Society of London is doing excellent work in promulgating a knowledge of ship sanitation. Mr. Romeril suggests that vessels should be under proper sanitary supervision while being constructed. With regard to lower forecastles, the space allowed should be increased at least in the ratio, if not to the same extent, as obtains in the case of passenger spaces similarly situated. Mr. Romeril directs attention to the proper insulation of boiler spaces; he gives a sketch of the very primitive mode of conducting enquiries into the causes of death.

Annual Report of the Medical Officer of the Local Government Board. London: Eyre and Spottiswoode, 1896–97.

The scientific investigations comprised in this report are of great practical importance. A preliminary report on the typhoid bacillus in soil is given by Dr. Sidney Martin. The investigation was suggested by Sir Richard Thorne, who, on reviewing an epidemic of typhoid in Chichester in 1896, drew attention to the steady diffusion of the disease on the appearance of a case in an insanitary area outside the city, and showed that it was not always a water-borne disease.

Dr. Martin has ascertained that the behaviour of the typhoid bacillus is very different when, in the absence of competing organisms, it is implanted in organically polluted and virgin soils. In soil of the first kind, as in samples of earth from Chichester, the bacillus grows rapidly and spreads abroad, whereas in virgin soil under like conditions of moisture and temperature it languishes and quickly dies out. The soil to be used for experiment was placed in an even layer at the bottom of an Erlenmayer flask. Inoculation was made in the centre and after varying periods test cultures were made from the centre and periphery of the flask.

Dr. Cantley has studied the conditions which affect the life of the typhoid bacillus in milk. He found that the typhoid bacillus can survive in milk under the ordinary conditions of transit, and keeping even when the milk has turned sour.

He also ascertained that when the number of associated organisms is smallest the bacillus can survive longest.

Dr. Klein records further observations on the immutability of the cholera microbe. He found that the spirillum in the interior of the oyster became profoundly modified, and that this modification was maintained through successive generations. Similar alterations can be produced by growing the organisms under various artificial conditions. These alterations are easily produced, but in no case could the organism be got to revert to its original morphological conditions.

Dr. F. W. Andrews has found that 'the *bacillus enteritidis sporogenes* described by Klein in 1895 is probably the cause of acute epidemic diarrhœa. He investigated many different forms of diarrhœa and the only anærobic microbe found at all commonly was the *bacillus enteritidis sporogenes.* Anærobic organisms do not normally appear to be inhabitants of the intestinal tract.

Dr. Klein has endeavoured to ascertain in what sense return cases of scarlatina or persistently infective persons differ from ordinary scarlatina convalescents.

In neither the cuticle nor in the urine has he been able to detect a microbe which can be thought of as the cause of the difference in question. Dr. Klein is proceeding with the investigation of the throat secretions and the nasal and aural discharges of persons in the convalescent stage of scarlatina.

Working on Dr. Coppman's lines, Dr. Klein has investigated the microbes of vaccinia and variola and isolated an organism to which he has given the name *bacillus albidus variolæ*. It is a small bacillus and forms circular colonies with a pure white colour. Sub-cutaneous insertion of an agar culture produces interesting results. In several calves thickening accompanied by scabbing and in one nearly perfect vaccine vesicles were obtained. Unfortunately the calves showed very little resistance when inoculated with current calf lymph from Lambs Conduit Street Station.

Dr. Klein enumerates the morphological and cultural features of the plague bacillus, and as a means of differentiation lays great stress on the appearance of the colonies in gelatine culture. He also tested plague material on the guinea-pig, which he found to be exceptionally susceptible to the disease.

Dr. Klein, however, failed to render the guinea-pig immune to plague infection.

The Local Government Board Report on the Epidemic of Typhoid Fever at Maidstone. This report of an enquiry opened on January 31st, 1898, to investigate the causes and spread of a recent epidemic at Maidstone, is full of exceedingly valuable information.

The medical officers of the Sanitary Authority from the first maintained that the disease was spread by the Farleigh water, while on behalf of the Water Company it was urged that the condition of the sewers and house drains was sufficient to account for the epidemic. After mentioning the latter theory the Inspectors proceeded to consider the former in detail; the evidence clearly established the fact that many of the springs, the sources of the Maidstone water supply, were in the neighbourhood of hop and fruit gardens, and that the surroundings of all were obviously and abominably filthy. Mr. M. A. Adams stated that there was a distinct relationship between the outbreaks of fever and diarrhœa on the one hand and the rainfall and consequent variations in level of subsoil water on the other.

To further explain this he classifies the soil through which foul surface deposits pass into three layers from above downwards, according to the effect on water of access of matter therefrom, viz. :—

(1) The danger zone, containing many putrefying organisms.
(2) The risky zone, containing nitrifying organisms.
(3) The safe zone.

When, however, the soil overlying sources of water is composed of clay, prolonged drought entirely alters these conditions. The clay loses cohesion, breaks into fragments, and it often presents deep fissures, through which foul surface deposits may be washed by heavy rainfall into the neighbourhood of the water zone, without having undergone previous purification. This Mr. Adams contends occurred at some of the Farleigh sources, where the subsoil is clay, by the heavy rains which, on August 7th and 8th and again at the end of August and early in September, varied the long spell of otherwise dry weather which commenced on June 29th. Mr. Adams also contended that this same rise in subsoil water which was followed in about sixteen days by the outbreak of enteric fever produced almost immediately the special form of diarrhœa which, as already stated, he regarded as premonitory of the subsequent epidemic. The Inspectors regard Mr. Adams' evidence suggestive of causative connection between these factors and the outbreak of typhoid fever, but as too incomplete to warrant the belief that the prevalence of diarrhœa referred to differed materially from ordinary summer diarrhœa.

The Inspectors in their summing up deal seriatim with the arguments advanced on behalf of the Water Company against the water borne theory of the epidemic.

Professor Corfield maintained that the defective sewers and drainage were sufficient to account for the epidemic; that the special incidence within the area of the Farleigh supply was not inconsistent with this view, as this area comprised the highest parts of the town, in which the effects of sewer emanations would, he stated, be most accentuated. Dr. Corfield's contention was dismissed as untenable, because of (a) its insufficiency to account for the sudden and simultaneous outbreak over a wide area, and the rapidity of its spread; (b) the pretty equal distribution of defective closets and drains over the whole town; (c) in the rural district, which has no connection with the Maidstone sewers, the disease shows the same relation to the Farleigh water supply; and the asylum, where there is no allegation of defective drainage, but which was supplied with Farleigh water, suffered heavily.

The Inspectors state that although there was no direct evidence of any specific typhoid pollution of the springs, the circumstantial evidence was so supplemented by the chemical and bacteriological examination as to leave no room for doubt: the chemical analysis shows evidence of dangerous pollution and there were conclusive bacteriological proofs of excremental contamination.

The Inspectors, while of opinion that many cases were due to soil-pollution from defective drainage, "have no hesitation in coming to the conclusion that the epidemic was caused by pollution of the water supplied by the Maidstone Company from their Farleigh sources."

The Inspectors further state that "the specific pollution of typhoid fever, which is certainly beyond the reach of chemistry and also of bacteriology to detect, may escape detection in a water in which it is nevertheless present. Further it has been borne in mind that detection of a specific pollution of a supply may come too late to prevent the consumption of the contaminated water. Clearly, chemical analysis and bacteriological examination should be supplemented by skilled inspections of the actual conditions, geological, topographical and sanitary, of the surroundings of the sources of supply."

III.—*Work of Societies.*

The Fourth Congress of Tuberculosis was held in Paris from July 27th to August 3rd. The President, Professor Nocard, said that the bacillus of Koch was one of the most resistant of the micro-organisms known, and the bacillus did not produce immunity against itself. The employment of the soluble products of the bacillus and subcutaneous intra-peritoneal and intravenous injections of serums from refractory animals have given no good results. The greatest hope for the future lay in prophylaxis. The rules laid down in 1889 by the Permanent Committee had not been observed by the general public. Professor Nocard considered that it was the duty of medical men to preach that tuberculosis was preventible arising in the majority of cases from contagion which could be easily guarded against. As regards bovine tuberculosis it had been shown that isolation of diseased animals was sufficient to at once check the spread of the disease, heredity playing only a minor part. Only about one-sixth of the cases of human tuberculosis could be attributed to heredity. As dried tuberculous sputum is the ordinary vehicle of infection, every effort should be made to render it harmless. Nocard deprecated legislative enactments, but recommended that all public places should be supplied with hygienic spittoons with a conspicuous notice forbidding anyone to spit anywhere else. In this way a reform in public habits might be produced which would render an effective prophylaxis possible.

The Annual Meeting of the British Medical Association was held in Edinburgh from July 26th to July 30th inclusive. The following notes give a resumé of the more important papers read at the Public Health Section. Dr. McLean Wilson read an interesting paper on the Pollution of Rivers. He pointed out that the Rivers Pollution Prevention Act for a long time remained a dead letter because the sanitary authorities failed to exercise the powers entrusted to them. The County Councils were created in 1888, and to them was committed the power of enforcing the Act. This constituted a great step in advance, but Dr. Wilson considered that the power of the Local Government Board under the same Act, to create a joint committee of the administrative authorities concerned in any river, was the best solution of the difficulty of administering the law.

The legal question whether or not a manufacturer has a right to discharge his trade refuse into a public sewer has not been definitely decided. The subject is very complicated, and to prevent injustice nearly every case has to be decided on local considerations, such as the method of sewage disposal, size of stream and amount of manufacturing refuse.

The same considerations have prevented the adoption of any fixed standard such as that recommended by the Royal Commission on Rivers Pollution. A solution of the difficulty has been proposed by many of the manufacturers in the West Riding of Yorkshire; that the manufacturer should have the right to call upon the Sanitary Authority to purify his trade refuse, and that the Sanitary Authority should have the right to ask the manufacturer to remove from his refuse anything which would interfere with the treatment of the combined sewage, and to impose on him a special rate to meet the extra cost of treatment.

"Surface Wells as a Source of Supply," was the subject of a paper read by Dr. Martin Cameron. He thought that surface wells, when properly protected, ought to be classed after the Upland Surface Water in the "wholesome" group. He considered that surface water which had percolated through a foot or two of turf and soil might be used with perfect impunity. Danger arose when the turf was destroyed by the plough and an easy way made for the direct influx of polluting matter into the pipes and probably into the well itself. Typhoid fever could often be traced to the ploughing and manuring of old grass fields which furnished water, or through which the water was led in ordinary drain pipes. Dr. Cameron considered that half an acre of ground round the well should be laid down in grass and kept scrupulously clean. In towns this is impossible and surface wells are out of place, but for villages protected surface wells might in many cases be preferable to expensive gravitation schemes.

The Hygienic Control of Milk Supply was a subject which was discussed at considerable length. Dr. Nasmyth thought that the notification of infectious diseases all over Scotland would prove to be the most stringent regulation for protecting the public in that country against milk infection, and all the more so, as by Section 164 of the recent Public Health Act, full compensation must be paid to all persons sustaining any damage by reason of the exercise of any of the powers of the Act. It is probable that when Local Authorities fully realize the risks they run by having to pay full compensation for the stoppage of a milk supply, they will insist on vigilant supervision of all dairies under their jurisdiction. Dr. Nasmyth also considered that more frequent sampling of the milk under the sale of Food and Drugs Act would do much to keep up its quality.

In Paris, Stockholm and in Germany the regulations controlling milk supply are very similar to those provided in England by the Dairies, Cowsheds and Milkshops Orders of 1885 and 1887. In Paris, however, large dairies are included in the second class of offensive and dangerous trades. In Stockholm, in case of diseases whether happening in a house near to a dairy, or in a room connected with the sale of milk, the Bureau of Hygiene must be informed at once. If the disease is infectious, the Bureau will take the necessary precautions for preventing the spread of the disease by milk. Until these arrangements are made the sale of milk is stopped. In Danish provincial towns milk inspection is not well regulated. The Philadelphia Board of Health and the New York Board of Health employ the tuberculin test, and cattle which do not stand the test are destroyed.

Eight hundred cubit feet per cow should be given in the byres with proper inlets and outlets. As cold byres are inimical to the production of milk, they should be artificially warmed. It is of great importance to have impervious surfaces both to the walls and floors. Systematic lime-washing of walls and roof will well repay the dairyman. No dairy regulations can be considered sufficient which do not provide for the exclusion of tuberculous cows. Dairymen and cowkeepers should have control over their milkers. In large towns this is difficult to obtain. Washing of their hands before milking is eminently desirable. Washing the teats and udders is very seldom done but it is of great value, and diminishes enormously the number of micro-organism.

The danger of creameries and the separated milk returned from them to the farmers has been well shown by Dr. Welply. The manufacture of sterilised milk under existing conditions of milk production ought to be encouraged by medical men. The sterilisation of milk vessels employed is of the utmost importance. All the vessels should be of block tin. Milk coolers are often made of enamelled fire clay and no objection can be offered to this material. The employment of wooden vessels for distributing milk is not to be recommended Milk vessels to be cleansed should first be washed out with cold water and then scrubbed with a brush and boiling water.

Dr. Chalmers joined in the discussion and said that as the Royal Commission on Tuberculosis had suggested that udder affections should be notified, it was advisable to include therewith every affection of the teats. He also thought that all illnesses among dairy workers should be notified.

Dr. Bond opened the discussion on vaccination with special reference to Prospective Legislation, and said that the Crude Vaccination Bill first laid before Parliament proposed to limit prosecutions to two or three at the most, to compel the use of glycerinated calf lymph by the public vaccinator unless the parent preferred some other form of lymph, and to offer the calf lymph at the home of the defaulter. He thought that the offer of calf lymph would by no means solve the vaccination problem, as in Germany, in spite of its use, there was a steady increase of opposition to vaccination. The German Government placed their reliance in minimising the opposition not on glycerinated calf lymph alone, but on a carefully devised administration The Crude Bill was amended in committee and the extended age limit within which vaccination is required was altered to six months.

Dr. Bond considered that domiciliary visitation was open to grave objection; it exposed the vaccinator to unpleasent treatment without hope of convincing a recalcitrant parent, and ignored the private practitioner, and so might easily produce friction between the public vaccinator and his professional brethren. The whole of the difficulty connected with the vaccination question has largely grown out of the maintenance of Boards of Guardians as the Vaccination Authority after the creation of Sanitary Authorities by the Public Health Act of 1872. The Government should have given the Local Government Board power to make a transference of the Vaccination Authority from the Guardians to the Sanitary Authority, in case the former body refused to carry out their duties. If Local Authorities proved recalcitrant, the Local Government Board should have power to insist on a minimum of resources for hospital accommodation and disinfection. The Bill as it now stands is silent on the subject of revaccination, it ignores vaccination by private practitioners, who are to be quite uncontrolled in deciding what is "efficient vaccination." The Sanitary Authority will have little power to promote vaccination in times of epidemic small-pox, and the medical officer of health will have neither responsibility for, nor official connection with, one of the most important branches of sanitary work.

Dr. Dixey in a paper on diphtheria in London arrived at the following conclusions:—

(1.) The amount of diphtheria in London is still high, but is now diminishing after a temporary exacerbation in 1896.

(2.) The experience of the last two years has disclosed nothing exceptional with regard to the seasonal relations of diphtheria.

(3.) The interruption to the usual course of diphtheria mortality, coincident with the two chief school holiday periods, is again apparent in both 1896 and 1897. The new evidence like the old tends to show that school infection is an important, though not the sole factor, in the spread of diphtheria.

(4.) A considerable but yearly diminishing number of cases of true diphtheria are still returned as croup.

(5.) A marked diminution of the case mortality of diphtheria set in at the end of 1894, and has continued up to the present time. The diminution is coincident with the employment of the treatment by antitoxin serum.

"The Etiology of Return Cases of Scarlet Fever." Dr. Millard considered that attempts to explain away return cases as being due to other causes than an infectious condition of the patient returning home were much to be deprecated. Other causes might operate occasionally but there was no doubt that in the majority of cases the infection was really carried by the patient leaving hospital. He did not think the infection was carried superficially as might be done by any person coming from an infectious atmosphere. Return cases were most common during the first week, and diminished uniformly during the succeeding weeks until they practically disappeared in the sixth week after the return home of the patient. Dr. Millard considered that the organism of scarlet fever most readily found a lodgment in the nasal cavity in those cases where infection was unduly prolonged. The risk of carrying infection appeared to fall after nine weeks' isolation, and after 12 to 13 weeks' isolation the chance of infection was almost nil.

Desquamation confined to the feet and occurring long after the process of desquamation on the body generally had been completed was not a source of danger. Otorrhœa was highly infectious, and all cases should be detained for 13 weeks' isolation.

The Congress of the Sanitary Institute was held under the Presidency of Sir Joseph Fayrer, Bart., at Birmingham. The Congress was opened on 27th September with an inaugural address by the President. In it he traced the steady advance Sanitary Science and Public Health Legislation had made during recent years, and the enormous benefits it has conferred on the nation are shown in the diminished sickness and mortality returns and in the increase in the average age at death. Nor is this confined to England alone. Our vast Indian Empire shows a similar state of things. The ordinary death rate of the British soldier had stood at the appalling figure, from 1800–1830, at 84·6 per 1,000; from 1830–1856, at 56·70 per 1,000. In 1893 it was 12·61, in 1895 15·26 per 1,000. Of course, epidemics such as fever, cholera, &c., disturb the regularity of the death rate, but it is certain that on the whole there has been great reduction of this. Valuable lives have been preserved to say nothing of the suffering and invaliding avoided.

Dr. H. Kenwood read an extremely interesting paper on the Natural Purification of Sewage. This paper was the outcome of experiments carried on by Drs. Kenwood and W. Butler. Experimental filter beds were constructed, the sewage being admitted at the bottom of one bed under anærobic conditions, and subsequently treated by intermittent downward filtration under ærobic conditions in one or more additional beds. The suspended matter was separated from the sewage in the body of the anærobic filter and required no attention. In Mr. Cameron's septic tank the sludge is mainly separated as scum; in Mr. Dibden's coarse filters it is for the most part left as a black mass on the surface of the filter and requires further attention. The sewage treated in the experimental filters was strong, containing 8·1 parts of free ammonia, 1·1 parts of albuminoid ammonia, and 79 parts of volatile solids per 100,000.

In No. 1 filter bed there was a continuous reduction of the more stable organic matter to unstable organic compounds, and of these unstable compounds to the ultimate products of anærobic organic decomposition. The albuminoid ammonia showed a mean percentage reduction of 37 on the original sewage. The oxidisable organic matter on the other hand diminished at first and then increased up to 24 hours. Associated with the diminution of albuminoid ammonia there was an increase of free ammonia which did not appear in the effluent, but was given off from the surface of the bed.

The second and third filter beds employed completed the purification.

Each filter bed appeared to have a state of equilibrium which adjusted itself to an average of the pollution of the intake. The nitrifying filter gave off no free ammonia at rest; the non-nitrifying filter on the other hand gave off, during the first 24 hours of rest, a mean of 0·39 milligramme of ammonia per square foot per hour.

The most active period of elimination is probably coincident with that of the most active reduction of the stored albuminoid ammonia to the free state. To discover the period of rest required by a filter which has been overtaxed, it is only necessary to make daily estimations of the ammonia eliminated, and when the active elimination has ceased the filter will have attained its equilibrium and be again ready for work.

The tendency to equilibrium shows something more than a mere straining of suspended matter and that often a precipitation of dissolved solids takes place.

It appears that however the filter may be constructed as to size and material of the medium, organic matter tends to collect in the filter and is liable to be washed out from its lower zones when the rate of out-flow is rapid. High albuminoid ammonia is an index for rest in a filter, high oxygen absorbed an index for passing to another filter under conditions permitting of good oxygenation.

Messrs. Kenwood and Butler consider that their anærobic filter-bed has great advantage over the septic tank. They say that the effluent from No. 1 bed has less colour, opacity, and odour than the raw sewage, while the sewage in the septic tank becomes progressively darker and more opaque, and the albuminoid ammonia remains the same or increases slightly. They consequently believe that upward filtration offers a better prospect of effecting the separation and solution of the suspended matters of sewage and at the same time of reducing the pollution of the effluent than does any system which aims at their removal by digestion in a hollow chamber, such as the septic tank.

With reference to methods of analysis and standards, Messrs. Kenwood and Butler consider that the oxygen absorbed figure is often more a measure of purification or of a stage of purification than a term of pollution, and that nitrates give no indication of what remains to be purified and their presence is consistent with profound pollution of a sewage effluent. Effluents of great purity often contain no nitrates and their presence appears to depend on the material; if this be coarse, nitrates will be found even in offensive effluents, if fine, further oxidation appears to take place at the expense of the nitrates. They think that standards should not be based upon the estimations of the amount of oxygen required to purify but rather on the organic nitrogen present, which is best determined by Kjeldahl's process. They consider that no general standard for all cases is possible or desirable, and what it wanted is a uniform method of procedure in the taking of samples and in the performance of the analysis.

Dr. G. Sims Woodhead, in his address to the section of Physics, Chemistry and Biology, touched on very many important points which are of great practical value. With reference to tuberculosis he said that we now know that there can be no tuberculosis without the presence of a specific micro-organism—the tubercle bacillus. Nearly 50 per cent. of our dairy, and therefore, our breeding cattle, tested with tuberculin react to the test. The children of tuberculous parents may be placed under such conditions that they will never contract the disease. They do not inherit tuberculosis from their parents, though they may inherit those weaknesses of tissue and constitution which render them peculiarly liable to succumb to the attacks of the parasites that in their parents are doing such damage. Strengthen the tissues, build up the constitution by good food, fresh air, and exercise, and whilst you are doing this, place the child under such conditions that the tubercle bacillus can gain no access to it, and by-and-bye there will come a time at which the attacks of the bacillus are as futile as they are against the child who inherits from his parents all those protective agencies with which healthy individuals are endowed for the warding off of the onslaught of pathogenic micro-organisms.

As regards diphtheria, Dr. Sims Woodhead carefully notes the results of the antitoxin treatment of this disease. As the outcome of his investigations, they all point in one direction, namely, whenever there is an outbreak of diphtheria, the first thing to be done is to inject not only the patient with a curative dose, but all who can possibly be exposed to infection with a protective dose of antitoxin. It has been proved that whichever agent, toxin or antitoxin, first gains access to the tissues, it holds the field, except against the attacks of enormously greater quantities of the other. If the diphtheria toxin gets in first and is left unmolested for some time, it so makes good its position that it can with difficulty be neutralised, and then only by large quantities of antitoxin, whilst on the other hand small quantities of antitoxin already circulating in the fluids of the body can render innocuous the attacks of comparatively large doses of toxin.

* * *

Dr. Sims Woodhead then referred to the treatment of sewage and referred to the experiments of Dibden on coke breeze beds and his extension of the Massachusetts experiments; to Scott Moncrieff for his addition of the anærobic bed to the oxidising plant; to Adeney for his experiments on the oxidation of the carbon and nitrogen elements; to Cameron and others who have made valuable contributions to this most important subject.

The Fifth International Congress of Hydrology and Climatology and Medical Geology was held during the last week in September at Liège under the patronage of H.R.H. the Crown Prince of Belgium. Many interesting papers were read, among which I may note one especially given before the whole Conference by M. Walthere Spring, the Professor of Chemistry at the university of Liège, on the Colours of Natural Waters, in which he showed experimentally that the true colour of pure water is blue, as in the lake of Geneva, and that this colour is the colour proper to the water and is not due to a mere reflection from the surface or from suspended particles in the water. That when pure water has a very slight cloudiness due to the presence of finely divided nearly white or colourless particles in suspension, even if these are absolutely colourless, as in the case of very finely divided rock crystal, a yellow tint is given to the water, which, together with the natural blue proper to the water itself, produces a green colour as in the cases of the lakes of Neufchatel and of Constance. He remarked that it had been noted by various observers that the water of certain lakes, ordinarily green, becomes occasionally absolutely colourless, and this he showed was due to the washing into the lakes of a fine mud of a reddish tint, due to the oxide of iron, which neutralises the green colour of the water, rendering it for the time being perfectly colourless.

IV. *Special Points of Hygiene.*

Foods.—A paper by Dr. Luff read at a meeting of the Royal Medical and Chirurgical Society contained the results of a series of researches as to the "Influence on Gout of the Mineral Constituents of Various Vegetables." His experiments go to show that the salts contained in the ash of nearly all the vegetables experimented on very considerably increased the solubility of sodium biurate, the salt of which uratic deposits consist. It was also shown that the ash of some vegetables, notably of spinach, Brussels sprouts, French beans, cabbage, and turnip-tops, very considerably delayed the conversion of the soluble quadriurate into the insoluble biurate, while the mineral constituents of meat diminished the solubility of the biurate and had but little effect in delaying the conversion of the quadriurate into the biurate.

The results of these experiments show that certain vegetables stood out prominently in regard to the influence on gouty changes exercised by their mineral constituents. These vegetables were spinach, Brussels sprouts, French beans, winter cabbage, Savoy cabbage, turnip tops, and celery. Dr. Luff suggested that a table salt composed of the ashes of these vegetables might be used by the gouty in place of ordinary salt.

Inspection of Meat.—The tables given in the annual report of the Director of the Leipzig Abattoir for 1897 give much interesting information regarding the results of the system of inspection adopted there. In Leipzig it is not the custom to destroy the whole of the carcase of every tuberculous animal.

A careful inspection is made, and according to the degree to which the disease is found to have extended, the meat is either allowed to be sold without any restriction, or only the fat is melted out and sold. This being understood, it is interesting to note that of 27,191 cattle slaughtered, 9,899 or 36·4 per cent. were tuberculous. In the great mass of these cases, however, the disease was localised, in 7,018 of them occurring in one organ only. Thus the flesh of 92·19 per cent. of the cattle in whom tuberculosis was discovered was sold for food without any restriction, and that of 5·73 per cent. was sold after sterilisation, or as second-class meat, and that the flesh of only 2·08 per cent. of the cattle found to be tuberculous was totally condemned. It was also found that a far smaller proportion of pigs than of cattle were affected with tuberculosis, but those pigs that were affected showed a much greater tendency to generalisation, so that the flesh of only 59·84 per cent. of the tuberculous was sold without restriction. On the other hand, very few pigs were totally condemned, which is rather curious in view of the comparative frequency with which the disease extended to the glands of the muscular system.

Since Bollinger in 1876 pointed out that the cause of certain illnesses affecting a number of persons, which frequently were set down to enteric fever, was in reality due to meat poisoning, the subject of meat poisoning has grown in interest from year to year.

Bollinger believed that the potency of the poison might increase *post mortem*, a view which subsequent investigations has shown to be correct.

Most of the meat poisoning cases are traceable to the flesh of animals that have been killed *in extremis*. Further, it has been shown that a particular class of diseases in the slaughtered animals is prone to render the flesh injurious to the consumer. The principal of these are polyarthritis septica of calves, hæmorrhagic enteritis of calves, septic metritis of cows, peculiar intestinal affections in oxen, and udder diseases of cows of a febrile character. Associated with these diseases are septic and pyæmic affections between which no clear line separating the one from the other can be drawn.

The following figures (Fritz Basenau in *Archiv für Hygiene*, Vol. XXXII, No. 3) show the much greater proportion of cases of injurious meat obtained from animals slaughtered *in extremis* as compared with those killed in the ordinary way during the years 1888–91 in Baden.

	1,000 slaughtered in ordinary way.	1,000 slaughtered *in extremis*.
Cattle	1·6	128
Calves	0·4	4·9
Sheep	0·2	20·2
Pigs	0·3	63·4

It would also appear that there is a difference to be noted between meat poisoning and sausage poisoning cases. In the former it is not the ptomains already developed in the meat which set up the disease, but the growth and development in the tissues of the body of particular bacilli; in the latter it is due chiefly to the poisonous chemical substances already formed in the sausages.

The report of the Royal Commission on Tuberculosis, which was appointed to inquire into the administrative procedure for controlling danger to man through the use as food of the meat and milk of tuberculous animals, reported to Parliament on 19th April.

With reference to tuberculosis in animals intended for food they recommend that the Local Government Board be empowered to issue instructions from time to time for the guidance of meat inspectors, prescribing the degree of tubercular disease which in the opinion of the Board should cause a carcase, or part thereof, to be seized. Pending the issue of such instructions we are of opinion that the following principles should be observed in the inspection of tuberculosis carcases of cattle.

(*a.*) When there is miliary tuberculosis of both lungs. (*b.*) When tuberculous lesions are present on the pleura and peritoneum. (*c.*) When tuberculous lesions are present in the muscular tissue or in the lymphatic glands embedded in or between the muscles. (*d.*) When tuberculous lesions exist in any part of an emaciated carcase.	The entire carcase and all the organs may be seized.
(*a.*) When the lesions are confined to the lungs and thoracic lymphatic glands.	The carcase, if otherwise healthy, shall not be condemned but

(*b.*) When the lesions are confined to the liver. (*c.*) When the lesions are confined to the pharyngeal lymphatic glands. (*d.*) When the lesions are confined to any combination of the foregoing, but are collectively small in extent.	every part of it containing tuberculous lesions shall be seized.

In view of the greater tendency to generalisation of tuberculosis in the pig, they consider that the presence of tubercular deposit in any degree should involve seizure of the whole carcase and of the organs.

In respect of foreign dead meat seizure shall ensue in every case where the pleuræ have been "stripped."

The other points dealt with by the Royal Commissioners and referred to in their report have reference to the provision of public slaughter-houses; the institution of an order of qualified meat inspectors: milk supplies; cow sheds, byres, &c., and the elimination of bovine tuberculosis in this country.

Butter.—The purification of rancid butter is now carried on with some success.

It is well known that the rancidity of butter is due to the liberation of butyric acids and other volatile acids and their derivations, through the action of microbes or, in other words, through the operation of decomposition; this decomposition mostly takes place in butter which has been badly made. In the process which has lately been introduced for the removal of these offensive products of decomposition, the butter is melted down with a certain quantity of butter milk, and stirred until a fine emulsion is obtained. Hot air is then drawn through the melted liquid by which means a churning action is set up and while the volatile acids are carried off, the solid impurities sink to the bottom and are removed. Then a current of cold air is made to take the place of the hot, and under its influence the butter begins to separate in granules as in the ordinary method of churning.

The result is excellent; good butter is made from bad, which is no doubt very ingenious. This process, which has been worked with great success in Sweden, is about to be introduced into Ireland. Dr. Emerson Reynolds testifies to the perfect success of the procedure, by which rancid and unclean butter is transformed into one of absolute purity and high quality with a corresponding enhancement of its market value.

Meat Extracts.—C. V. Voit maintains that "Extracts" are merely stimulants or condiments, and that though some of them do contain a variable proportion of nutritive substances as peptones, albumoses, and glycogen, the quantity that can be ingested in these forms is practically insignificant. Only the peptonised meats can be considered foods and even few of these consist of soluble myosin without any admixture of the comparatively useless gelatin, or of mere "extractions" which are but waste materials of the creative series. It may also be noted that Dr. Lauder Brunton considers meat extracts poisons if taken in excess.

Food Preservatives.—The principal methods for effecting food preservation are by (1) drying, (2) smoking, (3) salting, (4) sugar and vinegar, (5) exclusion of air, (6) cold, (7) mineral or organic antiseptics.

The preservation of milk is exceedingly difficult because this liquid is particularly liable to infection by any hardy germs.

Even when yielded by a healthy cow the milk on issuing from the udder is already infested with bacteria. When milking is ended, a small quantity of milk is left behind in the lacteal ducts, and in this there settle a number of bacteria which make their way from outside, are favoured by the high temperature, and become incorporated with the subsequent flow of milk. In addition to these there are innumerable bacteria originating in the dung and adhering to the udder. The air of the cowhouse is laden with germs and yields up no small quantity of these to the milk. The germs present in freshly drawn milk increase very rapidly during transport to the centres of consumption, as also during storage in milk shops. The reproduction can be moderated but not arrested by cold, because milk contains several species of bacteria capable of developing at 0° C. Diseased cows yield milk containing pathogenic organisms. Dr. Martin showed that one in every 13 samples of milk exposed for sale in Paris contained tubercle bacilli, and Dr. Schroeder in Washington found one in every 19 samples contained a sufficient number of bacilli to produce infection. Milk also is often the carrier of the specific organisms of typhoid, cholera. scarlet fever, and foot and mouth disease.

By heating milk to a temperature of 60° C. for one hour, 70° C. for ten minutes, and 95° C. for one minute, tubercle bacilli, if present, will certainly be killed. Cholera and typhoid organisms are still less resistant, and are killed more quickly than tubercle bacilli at the above temperatures. Only a single pathogenic species can withstand the short boiling to which milk is ordinarily treated in domestic management, and this is the anthrax bacillus containing spores. The danger from this source is remote, as the microbe does not form spores within the animal body.

Even in the worst cases, therefore, only vegetable forms, easily destroyed by boiling, can find their way into the milk from the body of the cow.

The lactic acid bacillus, always present in unboiled milk, and to which the souring of the milk is due, is easily destroyed by heat ; but the *bacillus mesentericus* often found in milk forms spores which are not destroyed by ordinary boiling, and germinate when the milk is kept at a moderately warm temperature, producing a brisk fermentation, whereby a large volume of gas is liberated.

The fundamental idea of Soxhlet's method for sterilising milk is to boil it for 40 minutes in small bottles, holding just enough for one meal, and closing the same with an impervious stopper, which is only removed just before use. Milk so treated will keep at the ordinary room temperature, as the spores of the *B. mesentericus* do not develop below 15° C., but if it be introduced into the alimentary canal of a child, the spores will rapidly multiply, and in such cases, large quantities of gas giving rise to flatulency will be formed, and possibly also poisonous decomposition products of albuminoid matter.

To render milk sterile in the strict sense of the word, it is necessary to raise it to a temperature of about 120° C. for twenty minutes. Under these conditions, unfortunately, the lactose decomposes into dark brown fission products, the fat loses its emulsified condition, and separates out as cream, which cannot be made to diffuse again even by shaking, and the albuminoids are converted into a form very difficult of digestion.

To overcome this difficulty Neuhass, Gronwald and Oehlmann introduced a method of fractional sterilisation, the milk being sterilised at a temperature of 80°–95° C. for half an hour on one day, and again at a temperature of 102° C. on the next day. Milk samples, however, sterilised in this manner have been found by Flügge in a state of decomposition.

In short, there is at the present time no practicable and certain method for freeing milk on a large scale from germs, without, at the same time, seriously prejudicing its flavour and nutritive value. Since then the destruction of the hardy germs is so difficult, the greatest care must be taken by washing the udder, hands, and milk vessels to secure extreme cleanliness in the preparation of milk intended for infant consumption. Sterilisation then becomes an easier task, the milk drawn under these conditions being very poor in spore-forming bacteria.

Large quantities of milk are often sent to dairies for the purpose of butter making, the milk from different farms being mixed, and the cream separated in the centrifugal machine. The skim milk resulting from the process is often returned to the farmer, and may become the medium of spreading disease wholesale, should any portion of the milk delivered to the dairy have been derived from a diseased cow. In this connection there is a strong movement in favour of legislative action for the compulsory heating of the skim-milk returned by dairies to the farmer.

It is imperative that cream destined for butter-making should be free from pathogenic organisms. The organisms of cholera, typhoid fever, and tuberculosis present in butter retain their vitality for a long time. As butter is consumed in the raw state, a reliable preliminary treatment of the cream is in the highest degree desirable.

Schuppan has shown that it is possible to produce good butter from Pasteurised or even sterilised cream, and Weigmann introduced the plan of artificially souring cream by means of pure cultures of *B. acidi lactici*.

The "grass flavour" or "June flavour" produced when the cows are foddered on tender grass, rich with blossom, can be imitated by means of a bacillus isolated by Corem in 1895. This flavour-developer has been tested in more than one hundred North American dairies.

In Denmark 84 per cent. of the butters exhibited at the butter shows during the year 1894 had been prepared with pure cultures of the lactic acid bacilli.

The same treatment with pure cultures of lactic acid cannot be used in the case of milk designed for cheesemaking, but fortunately the acid produced in the ripening process forms an effective antidote which checks the development of the pathogenic organisms. Weigmann showed that the *vibrio choleræ asiaticæ* persisted within 24 hours when artificially inoculated on cheese.

Boracic acid, salicylic acid, and even benzoic acid have been used as milk preservatives. Dr. Stevenson thinks that the influence of small doses of boracic acid is still *sub judice*, and believes four grains a day will not produce any deleterious effect. Ten grains should be the limit for a day. Dr. Stevenson also will not allow any boracic acid to be added to milk because it enables the milkman to palm off stale milk as fresh. Food purveyors have very indefinite notions on the question of quality, and while one considers 18 grains of boracic acid sufficient to preserve one pound of butter, another will use 80 grains. Neither is there any assurance that the same article may not be dosed more than once. Chemical preservatives ought to be prohibited altogether.

It is not unfrequently necessary to convert large quantities of milk into a permanently stable condition for use as food. At present there is only one single way of arriving at the object in view and that is, as, in the case of ordinary condensed milk, by thickening the milk and adding sugar. Some of the bacteria present in the milk, especially the lactic acid bacteria, are killed by the preliminary heating until nearly boiling, and the subsequent concentration at 50°–60° C. A few survive and are found still alive in the finished product, but not in a condition to do any damage, since the high concentration plasmolyses the germs, retarding their development, and so preventing decomposition.

In the preservation of meat we know that the blood and flesh of healthy animals are entirely free from bacteria, but, on the other hand, the contents of the digestive tract are extremely rich in microbes. If the carcase of a slaughtered animal be left without being disembowelled, these saprophytes will make their way through the capillary vessels of the intestinal wall into the general circulation, so that the entire carcase quickly begins to undergo decomposition. This can be prevented by the excision of the entire length of the alimentary canal, and if this be practised the remaining flesh will be perfectly free from fungi. Any subsequent changes can only be due to gradual penetration from the surface by way of the blood vessels into the interior of the flesh. Since these sources of bacterial infection cannot be entirely cut off, attempts are made to prevent the increase of these parasites in the flesh. The oldest known remedy is cold, but the temperature must be kept several degrees below zero (C.). The freezing of meat does not kill the germs present, but only hinders their development. If the meat be not stored at low temperatures, but merely put in the ice chest, whereby it only attains a temperature of 0° C., an increase of germs ensues. These cold-supporting organisms produce the disagreeable taste and smell acquired by edibles remaining in the ice-chest for a few days. Actual putrefaction is not produced by these bacteria.

Food-stuffs should not be brought in contact with natural ice, since this substance contains not only putrefactive organisms but also under certain conditions pathogenic organisms (especially typhoid bacilli) as well.

Frozen meat when thawed undergoes rapid decomposition because the cellular tissue is loosened by freezing, and access to theinterior is facilitated for any organisms present on the surface.

In dried and salted meat the development and activity of the organisms can be prevented by depriving them of the water necessary for metabolism. Hoffmann and Meinart have devised a process for the artificial drying of meat without destroying its flavouring matters.

In salting and pickling meat it is only the hygroscopic power of the salt which comes into play, the germs are plasmolysed and their activity so prevented. Tubercle bacilli are not killed by concentrated solution of salt after two months' action, and typhoid bacilli after three months' action.

Smoking forms a more reliable means of preserving meat, the active agents being the vapours of phenol, creosote, &c., present in the smoke. These antiseptics do not penetrate far into the flesh, therefore smoking can only preserve the fresh meat from healthy animals.

The best method of preserving meat at present available consists in steaming the meat in vessels which remain hermetically closed up to the time the meat is eaten. Such a food is known as tinned meat, corned beef from Chicago being most in demand. In Appert's process the meat is boiled in any convenient vessel and pressed into tins. These are then closed with the exception of a small aperture and placed in a bath of boiling water, the aperture being closed by a little liquid solder, after steam has been given off for a short time.

Many modifications of this method have been suggested, and there are now some 664 processes for preserving meat.

The sterilisation of impure drinking-water.—In my report last year (1896), reference was made to the bromine method suggested by Staff-Surgeon Dr. Schlumberg. The method is so simple and useful that we undertook to test it in every possible way. We therefore made a very large number of experiments on different potable waters. The solution was made by adding 21·91 grammes of bromine and 20 grammes of potassium bromide to 100 grammes of distilled water. By comparing the weight with the volume occupied by the solution it was found that 0·2 c.c. contained 0·05 gramme of bromine. A working solution was then made so that 2 c.c. contained 0·06 gramme of bromine. Experiments were first made to find out the amount of bromine which would destroy *B. typhosus* received from an agar slope and diffused in sterile distilled water. It was found that 0·06 gramme of bromine per litre of water after five minutes' exposure invariably destroyed the *B. typhosus* under these conditions. But as bromine combines with free ammonia, lime salts, and organic matter, it was necessary to determine what amount of bromine must be placed in waters from different sources and having varying degrees of pollution so as to still have a sufficiency of bromine to destroy the *B. typhosus* and organisms of a similar nature. Experiments were then made on the following lines:—Water from a polluted stream was analysed and found to contain 0·296 parts per 100,000 of free ammonia and 0·0936 of albuminoid ammonia. An agar culture of *B. typhosus* was then added to 100 c.c. of this water placed in a sterile flask. The flask was incubated at 37° C. for two days and then gelatine plates were made from the contents to serve as a control. Bromine solution in the proportion of 0·06 gramme per litre, was added to the flask and five minutes' later gelatine plates were made, each with 1 c.c. of the contents. From the control plates after 48 hours' incubation, *B. typhosus* was isolated, but the plates made after the bromine treatment remained practically sterile, no signs of the *B. typhosus* could be detected. The *bacillus mesentericus vulgatus* grew in some of the plates, but as it is a spore-bearing organism it was not considered necessary to determine the amount of bromine required to destroy it. The experiment showed conclusively that *B. typhosus* in the presence of large quantities of free and albuminoid ammonia was destroyed by 0·06 gramme of bromine per litre. A sterile water was then artificially polluted with sterile broth so as to cause the amount of ammonia present to equal that usually found in dilute sewage. *B. typhosus* was added to the mixture placed in sterile flasks after control plates had been made and bromine was added in gradually increasing quantities. It was found that 0·18 of bromine per litre was required to sterilise the contents of the flasks under these conditions of excessive pollution. It is not probable that water so excessively polluted would ever be used for drinking purposes; still the occasions might arise when highly offensive rivers and canals would be the only source of supply, so it was thought advisable to determine the amount of bromine which would render such waters sterile. With regard to hardness 0·06 gramme of bromine destroyed *B. typhosus* in deep well waters containing 5 parts of calcium sulphate and 20 parts of calcium carbonate per 100,000. From these experiments we believe that 0·06 gramme of bromine per litre will, after five minutes' exposure, render most surface waters safe for drinking purposes. If the colour of bromine should disappear completely from the water after standing for five minutes, showing that all the bromine has been used in chemical combinations, it will be advisable to continue the addition of bromine to the water until either a permanent yellow tint is obtained or the limit of 0·18 of a gramme is reached.

To remove the colour and taste of the bromine after five minutes' treatment, sodium hyposulphite, 0·095 gramme, and sodium carbonate (anhydrous) 0·04 gramme were added to each litre of water containing 0·06 gramme of bromine. The colour immediately disappeared, the water had a pleasant, sharp taste, and no odour of bromine could be detected.

Soil as a factor in the spread of disease.—It has long been known that surface soils contain a very large number of micro-organisms. The largest number is found at a distance of 12 to 14 inches below the surface and the number rapidly diminishes at a depth of 364 feet.

Dr. Robertson has shown that the typhoid bacillus can grow very easily in certain soils, it can persist in soils through the winter months, and when the soil is artificially fed, which may be effected by a leaking drain or by the access of filthy water from the surface, the micro-organism will then take on fresh growth in the warm season. The destructive power of sunlight is only exercised on these organisms actually on the surface. Cultures of the typhoid organisms planted at a depth of 18 inches were found to have grown to the surface. In the winter months the deeper layers of the soil act as a shelter to the organism, which again grew towards the surface during the summer months. The typhoid organism was not found to be taken off from decomposing masses of semi-liquid filth largely contaminated with a culture of *bacillus typhosus*. On the other hand, it was abundantly proved that this organism could grow over moist surfaces of stones, &c.

Certain disease-producing organisms, such as the bacillus of tetanus and malignant œdema, appear to be universally distributed in soil, while others as the *bacillus typhosus* and *spirillum choleræ* appear to have only a local distribution. The local distribution is associated with certain soil conditions, and a persistently polluted soil may help to explain the local distribution of typhoid fever which has been well demonstrated by Dr. Robertson's maps.

The importance of the subject has been well emphasized by Sir Richard Thorne, in his address to the Midland Medical Society, on November 6th, 1897. He then quoted the experiments of Dr. Sidney Martin for the Local Government Board, and said that "with a due sense of the restrictions imposed by the artificial character and the limited number of the experiments thus far reported on, we have reason for inferring that whilst one soil and set of circumstances are highly favourable to the vitality and propagation of the typhoid bacillus, another soil and set of circumstances are rapidly destructive to it; and we seem to be upon the border of a territory where some vein of actual knowledge is likely to be discovered which will materially assist, not only in solving the problem of the different behaviour of enteric fever as regards its persistence and recurrence in one and another dwelling town or district, but of further emphasising the value of that practice which has been adopted in this country for the prevention of typhoid fever."

The conditions which favour the vitality, growth and multiplication of the typhoid bacillus are—that the soil should be pervious, that it should be permeated with a sufficiency of decaying—preferably animal—organic matters, that it should possess a certain amount of moisture, and that it should be subject to a certain temperature. Depriving the organisms of any of these essential conditions for its existence in the soil will secure our best weapon for defence. The optimum temperature adapted to the growth and the spreading abroad of the typhoid bacillus is 37° C = 98·4° F.

Sir Charles Cameron has given some interesting information in a paper read at the Congress of Public Health in Dublin. He insisted upon the fact that typhoid fever in Dublin showed an excessive incidence upon those parts of the city which stand upon gravel as compared with those which have a stiff clay for their foundation. It had long been assumed that the soil of Dublin lying nearest to the river was water-logged, and that this was the cause of the prevalence of fever in those parts.

The explanation is that the low-lying portion of the city stood on gravel, from which the water rapidly drained away, while the higher portions were on stiff clays, by which the water was retained. The prevalence of fever in the lower part of the town had in fact nothing to do with water-logging; what it had to do with was the fact that gravel is a porous soil which easily becomes foul, and that the typhoid bacillus requires air for its development, which it can easily get on a damp gravel and not so easily in clay. A foul gravel is a most dangerous soil on which to build. For warmth, for dryness, for absence of fog and for facility of walking directly after rain, just when the air is at its purest and its best, there is nothing like gravel; but when gravel has been rendered foul by infiltration with organic matter, it may easily become a very hot-bed of disease.

Foot-soreness in Military Service.—All armies have to a greater or less extent suffered from this, which has been one of the most serious difficulties the medical officer has to deal with. There are always a certain number of men who suffer from tender feet. This is no doubt connected with the growth of micro-organisms, the warmth and moisture of the foot making the soldier's boot an almost perfect incubator, while the organic substances contained in the perspiration provide a constant supply of nutrient medium for the development of bacteria. The micro-organisms connected with perspiring and offensive feet have received much attention, these, there are reasons for believing, are many and various: the skin, the stockings and the boots themselves become so highly charged with micro-organisms that the smallest abrasion soon becomes a sore.

Many antiseptics have been employed for the purpose of destroying this microbeus life which so often leads up to the production of sore feet. Salt and water, vinegar, &c., were old remedies, washing the feet and the boots with a solution of perchloride of mercury, carbolic lotions and especially the free use of boracic acid in powder, both for the feet, the stockings, and the boots, have all been found of service.

The *Fusspulver* of the German Army, which consists of salicylic and chromic acid, has a double action, hardening the epidermis and probably checking perspiration as well as operating as a germicide. With the same object tannoform, a compound of formaldehyde with tannin, has lately been used. It is without smell, which is a great advantage, and is best used dry. Latterly, many of the best authorities advocate the use of simple formalin (an aqueous solution of formic aldehyde). In cases of offensive feet, the soles and the interdigital spaces should be washed once or twice a day with a 2 per cent. solution of formalin and the inside of the boot, especially the sole, washed out with the same solution and carefully dried afterwards. In a few days the offensive odour disappears. Gerdeck uses the strong undiluted formalin and he says when this has been applied to the feet a few times, they do not sweat again for two or three weeks; a few drops of the fluid are also to be dropped into the boots to disinfect them.

Formaldehyde Disinfection.—Schlossman (Berl. Klin. Woch. June 20th, 1898) states that there are two chief methods of carrying out this disinfection.

In Trillat's method an attempt is made to prevent the formation of polymers of formaldehyde by adding calcium chloride, whereas in Schering's apparatus para-formaldehyde is converted into gas, and this is again changed into formaldehyde by means of the water produced by the burning of a certain amount of spirit.

The probability is that in both methods the greatest part of the formaldehyde escaping into the air is converted into polymers. In the method introduced by Schlossman and Wallten polymerisation is prevented by the use of glycerine. Linguer has constructed an apparatus consisting of a vessel in which the water is boiled. The steam rises into a reservoir which contains 4 per cent. of formaldehyde and 10 per cent. of glycerine. From the reservoir four pipes pass into the room. A room with a cubic capacity of 2,000 cubic feet is filled with vapour in 10 minutes. All microbes are destroyed in three hours at the latest. The advantages claimed by Schlossman are: (1) The sterilisation is absolute; (2) The closure of all cracks and clefts is not necessary; (3) The procedure requires only three hours; (4) There is no danger of explosions; (5) The method is cheap; (6) The glyco-formal vapour is heavier than air and therefore sinks; (7) The total disinfectant powers of the gas are obtained. The windows are thrown open for half an hour after the disinfection. Liquid ammonia is then placed in the room in an amount proportional to the formaldehyde used. The windows are again opened and thus all smell is got rid of. The method can be carried out by any unskilled person. Hess made the bacteriological investigations for the author.

Numerous experiments have been made at Netley during the year with Schering's method. One tablet per 100 cubic feet has uniformly failed to give efficient disinfection, even when non-sporeless organisms were used for the trials. It has been found that rapid volatilisation is necessary to prevent the polymerisation of the greater part of the formaldehyde vapour. Five tabloids per 100 cubic feet appear to destroy anthrax cultures containing spores when smeared on linen and exposed in the room.

Three tablets per 100 cubic feet, when rapidly volatilised, destroyed cultures of *B. diphtheria* and *B. typhosus*, but pieces of linen soaked in broth culture of the same organisms were not always rendered sterile unless five tablets were rapidly converted into formaldehyde vapour by the heat and moisture derived from a large flame of Schering's lamp.

Disposal of Sewage and Refuse.—The disposal of typhoid excreta is a matter of much difficulty, especially in camps and on service in the field. In water-closet towns, stools, if not disinfected, may infect the sewers and watercourses. Strong disinfectants, and especially salts of mercury added to stools, coagulate albuminous matter and thus protect the bacillus with an insoluble casing.

A method has recently been suggested of dealing with the excreta by lining the bed-pan with a layer of some absorbent material, such as peat-moss, cotton wool, or saw-dust, so that eventually the contents may be destroyed by burning.

The Newcastle steriliser is used in some institutions. It consists of a hermetically closed iron vessel of 30 gallons capacity in which the excreta are boiled under steam pressure.

In towns where the pail system of night soil removal is in use, a special coloured pail, with an air-tight lid and charged with some strong disinfectant, is sent to the houses where typhoid fever is known to exist. This pail is removed at short intervals and its contents sent to the destructor. It is in midden towns especially that the danger arises, because it is impossible to ensure the disinfection of a midden once polluted by typhoid dejecta, and as these receptacles are seldom impervious, the surrounding soil soon becomes saturated with infective fæcal matter. Dr. Scurfield has reported on the connection between middens and typhoid fever. Professor Delepine has shown that a very close connection exists, and has found the typhoid bacillus in the soil around infected privies.

Dr. Sidney Martin, using organically polluted soils taken from localities where enteric fever was endemic, found that the *bacillus typhosus* multiplied and spread under favourable conditions of moisture and temperature, and were still living at the end of a period of 268 days. In virgin, peaty, and red sandy soils, the organisms showed no signs of vitality at the end of 14 days. The factors favouring the growth of the *bacillus typhosus* in soil are organic pollution, moisture and warmth.

At present the attempts made to devise a means for the immediate destruction of fæces by fire have not been successful. Recently, however, at the Redlitz artillery barracks a "fire closet" has been erected and most successfully worked. From a long trough the fæcal matter runs to a finely-meshed grating, where the urine strains off. When a sufficient bulk of these materials has collected, a furnace is lighted, evaporates the urine and dries and partially destroys and incinerates the solid material. The unburnt gases, smoke, and dust are drawn into a second furnace, where their destruction is then completed. The furnaces are of such a size as to be able to deal with the excrement of 350 to 500 persons and are worked for 10 hours every fourth day. Oil or coke may be used as a fuel, small quantities only being required, for the material operated upon contains 23 per cent. of combustible matter. The ash amounts to three grammes per head per day. The fire closet may be used for liquids only, and is equally efficacious. Where other systems are impossible it may prove of service.

One of the strongest objections to earth closets has been the fact that bacilli may remain alive for almost indefinite periods in mould or ashes. Sinnhubler, however, states that if 10 per cent. of quicklime be added to dry mould it acquires bactericidal powers and retains them for a long period. With the addition of 3 per cent. of quicklime, cholera vibrios died in four hours, and with 8 per cent. addition they died in 15 minutes.

Petter of Yeovil has devised a domestic refuse-destructor for disposing of such materials as cabbage leaves, fish bones, &c. The destructor is part of the kitchen range, the ashpit of which is completely enclosed for drying the material. All grease or fat is absorbed by the ash falling through the fire bars. When thoroughly dried, the waste material is shovelled into the fire, the draught for which is provided by means of holes in the door. All fumes are destroyed by being carried through the fire. The range is really a slow combustion stove and being also partly fed by domestic refuse is very economical in its working. Its adoption would do much to improve the present offensive condition of ashpits or dustbins.

The following is a list of the samples of the waters, foods, &c., sent to the Hygiene Laboratory at Netley for special analysis, and reported on to the War Office during the year :—

	Samples.
Waters	105
Sewage effluents	4
Malt liquors	3
Butter	1
Milk	5
Meat extracts, essences, &c.	6
Air	8
Cockles	1
Mussels	1
Filters	3
Paint	1
Crystallised egg	2
Disinfection apparatus	2
Albene	1
Flour	5
Vinegar	5
Bromine	2
Charcoal	1
Calcic hypochlorite	2
Complete food	1
Falona	1
Bread	4
Evaporated vegetables	6
Extract of flour	1
Ice-making machine (for testing)	1
Sterilisers	2
Green netting	1
	175

The following table gives the means of the analyses of water in parts per 100,000 :—

Table of Drinking Waters according to Purity.

No.	Class of Waters.	Chlorine.	Oxygen required for Organic Matter.	Ammonia.		Nitric Acid.	Hardness.	
				Free.	Albuminoid.		Total.	Fixed.
64	Fit for use	2·3	0·051	0·002	0·005	0·686	12·3	6·2
14	Usable, but requires filtration.	2·7	0·075	0·006	0·013	0·872	18·4	8·9
27	Unfit on account of organic impurity and of excessive hardness and chlorides.	5·5	0·057	0·019	0·023	3·060	32·8	20·1

Nearly all the samples were examined bacteriologically, and in every case of a suspicious water the number and character of micro-organisms present were noted. In no case was any specific pathogenic organism found.

APPENDIX No. II.

I.—LIST OF OPERATIONS PERFORMED AT THE ROYAL VICTORIA HOSPITAL, NETLEY, DURING THE YEAR 1897-98.

II.—RETURN OF INVALIDS ADMITTED INTO THE ROYAL VICTORIA HOSPITAL, NETLEY, FOR WOUNDS AND INJURIES RECEIVED IN ACTION DURING 1897-98.

By Colonel W. F. Stevenson, Royal Army Medical Corps, Professor of Military Surgery, and Major W. Dick, M.B., Royal Army Medical Corps, Assistant Professor, Army Medical School, Netley.

I.—List of Operations Performed at the Royal Victoria Hospital, Netley, during the Year 1898.

Operations.	Number of Cases	Disease, &c.	Results.				Remarks.
			Completely successful.	Partially successful.	Failed.	Died.	
Removal of carious bone	6	Caries	5	—	1	—	
,, ,, sequestra ...	17	Necrosis	15	—	2	—	
Incision and drainage ...	7	Abscess of liver ...	3	—	—	4	
,, ,, ,, ...	5	Chronic abscess ...	5	—	—	—	
,, ,, ,, ...	3	Empyema	1	2	—	—	2 still under treatment.
Excision of veins ...	20	Varix, leg.	20	—	—	—	
,, ,, .	3	Varicocele	3	—	—	—	
Amputation—fingers ...	2	Tubercle of joints, etc	2	—	—	—	
,, thigh ...	2	,, ,, knee 1, accident 1.	2	—	—	—	
,, leg ...	2	Gunshot wounds ...	2	—	—	—	
,, toes ...	1	Hammer toes ...	1	—	—	—	
Resection of bones ...	1	Ununited fracture	—	1	—	—	Still under treatment.
Excision of joints, elbow	4	Gunshot wounds ..	4	—	—	—	
Operation for radical cure.	12	Inguinal hernia ...	12	—	—	—	2 still in hospital.
Excision of Glands ..	11	Suppuration of glands.	6	5	—	—	
,, ,, Cyst... ...	1	Sebaceous	1	—	—	—	
,, ,, Tumour ...	1	Fibroma	1	—	—	—	
,, ,, ,, ...	1	Osteoma	1	-	—	—	Still in hospital.
Sinuses laid open and scraped.	12	Sinus, neck, groin, etc.	12		—	—	
Dilatation of sphincter and ligature.	9	Piles	8	1	—	—	1 still in hospital.
Carried forward ...	120	Carried forward ...	104	9	3	4	

Operations.	Number of Cases.	Disease, &c.	Results. Completely successful.	Partially successful.	Failed.	Died.	Remarks.
Brought forward ...	120	Brought forward ...	104	9	3	4	
Excision of eyeball ...	3	Panophthalmitis 2, wound 1.	3	—	—	—	
Castration...	5	Tubercle, etc. ...	5	—	—	—	
Removal of tunica vaginalis.	1	Hydrocele	1	—	—	—	
Trephining of tibia ...	1	Chronic osteitis ...	1	—	—	—	
Circumcision	8	Phimosis, etc. ...	8	—	—	—	
Reduction of dislocation	1	Elbow	—	1	—	—	Still in hospital.
Wiring of bones	1	Compound fracture	1	—	—	-	
Removal of foreign body	11	Bullet	11	—	—	—	
,, ,, ,,	1	Needle	1	—	—	—	
Total	152	Total	135	10	3	4	

NOTES ON SOME OF THE OPERATION CASES OF INTEREST, AND REMARKS ON SOME OF THE WORK IN THE SURGICAL DIVISION.

Ununited fracture; ends wired.

Private L., 2nd Oxfordshire Light Infantry, was admitted on 23rd March. with an ununited fracture of the left tibia about 5 inches above the ankle joint, the result of an accident. The fracture had been of both bones and simple; the fibula united well, but the union in the tibia was only fibrous. A skiagraph showed a transverse fracture of the latter bone, a clear space of about ⅜ of an inch intervening between the ends. Fixation in splints was tried for a further period of 2 months, but the union did not become bony. On the 31st May, an incision was made over the site of fracture and the condition of the bones examined, when it was found that the ends could not be approximated without section of the fibula. This was accordingly made through another incision, and it was found that the ends of the tibia came into contact without necessitating the removal of any of the fibula. The periosteum was raised from the ends of the tibia, a thin layer of bone removed from each, and a stout silver wire passed through them and twisted, bringing them into contact. The fibula was then wired in a similar manner: dry dressings were applied and the leg put up in a box splint and slung. After 6 weeks a plaster case was put on. Two months later, when it was removed, it was found that the union in the tibia was still only fibrous, the fibula being quite firm. Four months after the first operation an incision was made through the cicatrix and a tenotomy knife passed through the fibrous material joining the ends of the bones; the wire was tightened by giving it a half turn, thus pressing the broken ends together. On 31st October, a barely perceptible amount of movement could be obtained at the site of fracture, and only with difficulty and on careful examination: union was not perfect, but the bone was much stronger than it had been at any time since the occurrence of the accident. This man appeared to be in perfect health, and no cause can be assigned for the want of repair in the broken bone. He still remains in hospital.

Excisions of the elbow joint.

The operation of the excision of the elbow was performed in 4 cases for ankylosis of the joint, in 3 the result of gunshot fracture and in 1 of accident, the limbs being fixed in a faulty and almost useless position. On the whole the final results were very satisfactory, 3 of them regaining almost the normal movements as regards flexion and extension, being restricted only in pronation and supination, and the wasted muscles rapidly developing in size and power with massage and exercises until they equalled those of the other arm in these respects. The case in which the result was not so good was one for which a partial primary excision had been done in the Field Hospital, two inches of the ulna having been removed. When the excision was made complete by operation here, the new joint was necessarily composed of the radius and humerus only, and although movement was good, it never became strong. Nevertheless the patient expressed himself as preferring the movable joint to the ankylosed one, and no doubt it may reasonably be expected that its functions will improve with time and use. The partial failure in this case bears out the commonly-held opinion that incomplete excisions of the elbow for gunshot injuries of the joint are not as successful in their final results as are the complete operations, and that, although only some of the bones entering into the articulation are fractured, portions of all of them should be removed.

The particular method of operation employed in all the cases was the same, that by means of the longitudinal posterior incision outside the ulnar nerve. But little difficulty was experienced in raising the periosteum from the bones, as the membrane stripped readily, probably a result of the inflammatory processes which had lately been going on in the joints. Drainage was employed for 48 hours, and a metal splint with a hinge at the elbow was used in the after treatment. The position of the forearm as regards flexion and extension was changed every day or two almost from the first, and great attention was paid to passive motion, commencing a fortnight after the operation. Later the patients were made to exercise the limb several times a day and for as long a time as possible. The results of these cases warrant us in entertaining a high opinion of the operation under the circumstances referred to.

Amputation of the thigh.

Two amputations of the thigh were performed, one for tuberculous disease of the knee, and the other for a compound and severely comminuted fracture of the femur in the lower third, in which great deformity had taken place, but no union, and where no other procedure was possible. Both operations were done in the lower third of the limb, by means of the long arterior and short posterior flaps, and made good recoveries.

X-Rays.

The employment of Röntgen-ray photography has been of inestimable value in the diagnosis of cases in the Surgical Division during the year, and in rendering their proper treatment possible. The coil used is a powerful one giving an 18-inch spark, and we have obtained the best results, as regards penetration of thick structures and clearness of definition, with Cossar's osmium tubes and a large German tube supplied by Mr. A. E. Dean, the latter being especially effective for screen work.

The osmium tubes just mentioned are the result of much experimental research carried out by Mr. J. Mackenzie Davidson, of Charing-cross Hospital. These tubes have the anode made of osmium and placed at the focal length of the cathode. Under these circumstances the radiant point on the anode, the source of the X-rays, is extremely small, and the definition, therefore, clear. From 1½ to 2 minutes' exposure is sufficient to obtain good photographs of the head or pelvis with these tubes.

All the cases of fracture and dislocation admitted during the year were diagnosed, or the diagnosis verified, by means of skiagraphs, and when the dislocations had been reduced, and the fractures "set," photographs were again taken to make sure that the bones and fragments were in proper position.

Second skiagraphs were particularly useful in cases of comminuted fracture of the femur, showing, as they sometimes did, that the usual manipulations for bringing the fragments into normal relation to each other and for reducing the shortening had not been quite satisfactory. They also enable the surgeon to determine whether the amount of extension by weights which he has applied is just sufficient to permit of the broken ends remaining in contact, that it is not too much and is keeping them apart, and not too little, allowing them to over-ride each other.

Some cases of injury to the elbow joint were sent from out-stations for diagnosis by X-rays, when, from swelling and other difficulties, the exact condition was not to be recognised with certainty. One of them was especially interesting, that of a child of 6 years of age. The case looked like, and was supposed to be, one of dislocation of both bones backwards, but a skiagraph showed it to be a comminuted fracture of humerus close above the epiphysis and a fracture of the olecranon process of the ulna. Probably no injury of bone or joint affords greater difficulties of diagnosis than those about the elbow occasionally do, and in these a skiagraph, or two from aspects at right-angles to each other, renders the condition apparent with absolute certainty, almost as much so as though the tissues covering the bones were transparent.

In skiagraphing fractures of long bones the surgeon should never be satisfied with taking one. Skiagraphs from two aspects of the limb are necessary to demonstrate the whole condition of the fracture. A skiagraph, it must be remembered, is merely a picture of a shadow, and it is quite possible (indeed it happened so frequently in our own experience) that one taken from front to back of a limb shows no displacement of the broken ends, while one from side to side proves them to be over-riding to a more or less considerable extent.

Localisatio of foreign bodies by means of X-Rays.

The wonderful facility with which the surgeon can ascertain the condition of the bones in cases of fracture and dislocation by means of skiagraphs is, if possible, surpassed by the simplicity and accuracy with which the same means enable him not only to discover the presence of foreign bodies within the tissue, but even to localise their positions as regards depth from the surface as well as their relative positions to surface markings on the skin. The apparatus necessary for this purpose, also invented by Mr. Mackenzie Davidson, has been in use here now for some months, and has proved invaluable in cases where bullets or other foreign bodies had lodged. The apparatus has been described in the medical journals, and needs no reference to its details in this report.

In 11 cases bullets were removed, and in one a portion of a needle from the hand, and in all of them the foreign body had been localised previous to operation. Some idea of the position of a foreign body may be obtained by taking two skiagraphs at right-angles to each other; its latitude and longitude, as it were, can be approximately made out in this way, but with Davidson's localiser its position can be demonstrated almost to a hair's-breadth. If the surgeon carries out the details of the method correctly (and they are quite simple) and operates according to the indications supplied by it, he will reach the foreign body with absolute certainty. If, when the skiagraphs are being taken, markings similar to those on the side of the limb next the sensitive plate be made on the upper surface, the measurements may be taken from them, thus permitting the surgeon to operate in the direction of least surgical or anatomical difficulty. Mr. Davidson was good enough to come to Netley in order to demonstrate to us his method and the use of his apparatus, and he himself localised the bullet in the pelvis in the case of Lance-Corpl. E. (*vide* report on gunshot wounds). This may be considered a test case; there certainly was a sinus leading to the bullet, but a probe did not show its presence, and, without the certain knowledge afforded by the localiser, no surgeon would have been justified in exploring to the depth necessary for its extraction.

Another case was instructive in this connection. A man sustained a gunshot fracture of the femur in the Tirah campaign, the bullet lodging in the limb. The fracture united well, the bullet gave no trouble and he rejoined his regiment. He returned to Netley in October in consequence, as he informed us, of the pain and inability to walk caused by the bullet in his thigh. On the outer side of the middle of the limb there was an extremely painful spot, and close under the skin a hard substance which the man himself indicated as the bullet: on examination we had no doubt but that it was so. But, on taking a skiagraph, the hard substance at the painful spot was found to be an enlargement at the lower end of the upper fragment of the fractured femur, and that the bullet was in quite another part of the limb and doing no harm whatever.

Since the method of localisation includes the taking of two skiagrams from different positions of the tube, about 7 c.m. apart, it follows that when prints are made from the negatives, we have stereoscopic views of the parts, and when they are mounted and placed in a Wheatstone's stereoscope we see the foreign body and the bones in relief and in their actual relation to each other. Stereoscopic views of this kind do not indicate the depth at which foreign bodies may be lying from the surface; because, in fact, the surface of the body and the soft parts are not seen in the skiagraph; but they show at which side of a bone a foreign body is placed, and they enable the surgeon to form correct ideas of the relations to each other of the fragments of a comminuted fracture.

This stereoscopic effect may be rendered more apparent by painting the skin over the part to be skiagraphed with a thin coating of bismuth and glycerine. The bismuth paste is somewhat opaque to the rays and appears to render the skin visible. The stereoscope then shows the bones of the limb, and any foreign body which may be lodged, surrounded by a cylinder of skin and in their natural relative positions with the latter.

he use of
ecalcified
ancellous-
one tissue.

Excellent results have been obtained by the use of decalcified cancellous-bone tissue in certain cases. Mr. Robinson of Huddersfield (*Lancet*, Oct., 1897) suggested the employment of this material in the treatment of sinuses and deep ulcerations of the soft parts, on the same principle as sponge-grafting has been tried, as a foundation for the more rapid development of capillary vessels in the healing parts. Mr. Arbuthnot Lane, of Guy's Hospital, has still further extended its uses by treating cavities in bone by means of it, and demonstrated his method to us on a patient in Guy's Hospital. Mr. Lane informed us that when in any operative procedure he had to make a cavity in a bone, he used the cancellous-bone tissue to replace the bone removed. When the part is aseptic he fills the cavity with the bone tissue, squeezed dry out of an antiseptic solution, and sutures the skin over it; but even in cases of necrosis and caries, where the condition is unlikely to be one of complete asepsis, he found its employment of great advantage in increasing the rapidity with which the new bone is developed. We tried it on two cases, one of each kind, one of necrosis and one of trephining the tibia. In the case of Lieutenant P. (*Vide* Report on gunshot wounds) there was, after the second operation, a considerable cavity left in the tibia by the removal of the sequestrum, which was filling up very slowly. When the treatment with bone tissue was commenced the cavity filled up rapidly. The case was dressed every third day, bone tissue being packed in flush with the surface of the tibia; at the next dressing, none of the bone tissue remained visible, all of it having apparently been absorbed, but the bottom of the cavity had approached the surface to a remarkable extent, and this process continued until very little depression remained and the part skinned over.

In the second case the head of the tibia was trephined for suspected abscess. This was an aseptic case. No abscess was found; the trephine-hole was packed with the decalcified bone tissue, and the skin closed over it. The wound healed by first intention, and no depression was to be felt at the site of operation. Decalcified cancellous-bone tissue is prepared by Woolley and Co., Manchester, and is supplied in an aseptic condition.

Viring of
ones.

Private A. J. D., Army Post Office Corps, was admitted into this hospital on the 17th August, 1898, from manœuvres at Bulford Camp. The previous day a cart had overturned on him. On admission he was found to have a compound comminuted fracture of the right tibia and fibula. There was considerable loss of skin and soft parts. The lower end of the upper fragment of the tibia was projecting out of the wound, and there were several small pieces of bone lying loose; the fibula was felt to be broken into several fragments. After rendering the wound aseptic, great difficulty was found in getting the fragments of the tibia into place, and keeping them there; the tendency being always for the upper fragment to slip out of the wound and project. Accordingly the man was at once put under an anæsthetic, and a thorough examination made. The small pieces of tibia just at the wound were removed, the fragments of the tibia moulded into shape, and the upper and lower fragments of the tibia were drilled and tied together with stout silver wire—the wound was thoroughly washed out, and the jagged pieces of skin were brought together as much as possible by stitches. The limb was then done up in antiseptic dressing and laid in a box splint. The man never had a rise of temperature, and the limb is now united and strong—of course there is a certain amount of deformity, but there is no shortening. The man is still in hospital but in all probability he will have a most useful leg.

Excision of
yeball.

There were three cases of excision of the eyeball. In two, gonorrhœa had given rise to panophthalmitis, for which they had been invalided home; some appearance of sympathetic inflammation of the sound eye in both cases gave rise to the necessity of extirpation of the diseased eye—both did well. The third case, that of Private T. O., 2nd Hampshire Regiment, is of some interest. The man was admitted from manœuvres with a wound of the upper eyelid, on the 10th September, 1898. He gave the following history: he was cleaning up camp, and threw a lot of paper and other rubbish into a heap and set fire to it. He was bending over this fire when a cartridge which had been amongst the rubbish exploded and struck him on the upper eyelid. On admission a wound was found on the upper eyelid penetrating it, and corresponding to it there was a wound in the upper part of the sclerotic. All vision was lost. On examination the anterior chamber was found to be full of blood, and no reflex could be obtained by the ophthalmoscope. Vitreous humour in small quantity was escaping from the wound. A compress and bandage were put on, and from time to time the eye was examined, but no improvement took place, the wound in the globe made no attempt at healing. So on the 18th October, 1898, the eye was extirpated, to save any sympathetic inflammation of the other side. Prior to operation a skiagraph was taken, but no foreign body was found. After removal the eye was found to be disorganised but there was no foreign body. The man has done well.

Removal of tumour.

Two cases of tumour were operated on during the year:—

One case, that of Private M. M., 2nd Leinster, was sent home from the West Indies, arriving at Netley 31st August, 1898. It was of slow growth, situated over the right great trochanter, and was thought to be bursal in its origin. It was very hard and quite movable. On the 28th September it was dissected out, when it proved to be fibrous in its nature and almost of cartilaginous consistency. The wound healed by first intention, and the man was discharged fit for duty on the 22nd October, 1898.

The other case, that of Private J. E. H., Medical Staff Corps, a man belonging to the detachment at this station, was a bony tumour growing from the front of the right tibia, just above the ankle-joint. The tumour had been growing for five months, and was gradually getting larger, and preventing the man from wearing a boot; it was also causing some pain in the leg from pressure. He was admitted on the 10th October, 1898, and the tumour removed on the 18th October. It was found to be attached to the antero-external surface of the tibia by a broad base, which was chiselled through. The surface of the tumour was covered by cartilage over which the tendons glided. The structure of the tumour was that of cancellous bone tissue. The wound healed by first intention. The man is still in hospital, but is practically quite well and will be discharged in a few days.

Extraction
bullet.

Private R. R., Royal Inniskilling Fusiliers, was admitted into this hospital as an invalid with perforation of the membrana tympani, for which he was invalided out of the service on the 20th January, 1898. In June, 1896, a saloon pistol bullet entered the inside of his right calf and lodged. On the 3rd January, 1898, a skiagraph was taken of the leg, and the bullet shown to be lying on the outside of the leg, it having evidently passed to that side between the tibia and fibula. On the same day local anæsthesia was produced by cocaine, and the bullet extracted. The wound healed by first intention, and the limb was perfectly sound, but as above stated the man was invalided for the disease of his ears.

Varicose veins.

Twenty operations for varicose veins were performed during the year and all of the men went to duty. They were all ordinary cases, and the usual operations of excising small portions of veins in a number of places was done. No complications during the after treatment of any of these cases occurred.

Varicocele.

Three operations for varicocele were performed, all of them being done by the high or inguinal operation, so as to be removed as far as possible from sources of septic infection. Two of these did well, but the third was a very tedious case. The man was a very malarious subject, and during the whole after treatment he had continual attacks of ague. Whether on account of this constitutional condition or from having used strong solution of carbolic acid, in the rendering the parts aseptic previous to operation, gangrene of the most dependant part of the scrotum took place. When this slough began to separate, septic infection of the operation wound took place, and consequently it was much longer in healing than usual. Even after the wound healed, hardness and even deep suppuration took place in the iliac region. This was eventually opened and drained, a considerable quantity of pus being found. The case, however, ultimately did well and the man was discharged to furlough.

Radical cure
f hernia.

Twelve operations for the radical cure of inguinal hernia were performed during the year. The method was fully described in last year's report. All of them were successful, ten being discharged to duty, and two still remaining in hospital; one of these latter had a double hernia, that of the left side has been operated on, and the right side will be operated on as soon as the man has recovered from a syphilitic affection with local pustules. The other man is quite well, but as it is only three weeks since the operation it is too soon to allow him out. All cases operated on go out to duty without trusses.

Empyema.

Three cases of empyema were operated on; one was successful, and the other two were partially so. The history of the successful case was that it followed upon pleuro-pneumonia. The two partially successful cases are still in hospital, viz.:—

Lance-Corporal J. W., Gordon Highlanders, admitted here on 29th March, 1898, suffering from tubercle of the lung. The left pleura was aspirated on 19th April and 50 ounces of greenish serous fluid drawn off. On the 5th May, 1898, the left pleura having again filled, aspiration was performed in the 6th intercostal space, and pus found; an incision was then made, and 100 ounces of purulent material evacuated. No resection of rib was made. The patient did very well, got strong, and put on flesh, but a sinus has remained, and continues to discharge. The man still remains in hospital.

Private T. P., 1st Somerset Light Infantry, was invalided home for enteric fever. On the 21st April, 1898, he was in a very critical condition, the left pleura being full of fluid; accordingly, in the evening he was aspirated and 80 ounces of pus drawn off. On the 23rd April an incision was made between the 7th and 8th ribs and a portion of the 8th rib excised, 100 ounces of pus drained away. The heart in this case was very much displaced to the right side. This patient also improved very much, but in this case also a long discharging sinus has resulted which shows no appearance of closing up The patient still remains in hospital.

Abscess of
he liver.

Seven cases of abscess of the liver were operated on during the year, four of these proved fatal, an unusually high percentage of deaths. The details of the fatal cases are as follows:—

Gunner G. V., 16th Company, W.D., R.A., was admitted to the Royal Victoria Hospital, 16th April, 1898, having been invalided from India, with congestion of the liver, the history of which dated back to January, 1898. On admission here there were symptoms of abscess, and three days afterwards, after aspiration, an incision was made through the 7th interspace, and a large quantity of pus was evacuated. On the 25th April he had unmistakable symptoms of peritonitis, and died on the 28th April. On post mortem examination the liver was found to be greatly enlarged; the incision of the operation was found to communicate with a large abscess cavity on the upper surface of the right lobe. Another abscess was found in the left lobe which had opened into the peritoneum, giving rise to the peritonitis which was the immediate cause of death. Several other small abscesses were found in the substance of the liver.

Sergeant F. I. W., Royal Horse Artillery, was admitted from India on the 6th February, 1898, suffering from dysentery which he had contracted on the Indian Frontier. On admission here an abscess of the liver was diagnosed and on the 19th May, 1898, he was operated on. An incision was made in the 6th interspace and a portion of the 6th rib removed. A large quantity of pus was evacuated. Unfortunately the dysentery continued and he died of exhaustion on the 28th June, 1898. The relations did not permit a post mortem examination.

Driver T. C., 10th Field Battery, Royal Artillery, was admitted to this hospital on the 28th April, 1898, suffering from dysentery contracted in India. The dysentery continued and symptoms of abscess of the liver developed. An incision was made in the 8th interspace on the 16th May and 50 ounces of pus evacuated; a piece of rib was not removed; free drainage was maintained, but the dysenteric symptoms continued unabated, and he died on the 12th July, 1898, from exhaustion. On post mortem examination only one large abscess cavity was found, but numerous dysenteric ulcers were found in the large intestine.

Sergeant J. E. H., 11th Hussars, was admitted to this hospital from India on the 29th March, 1898, with hepatitis. He had a previous history of an abscess of the liver having burst into his lung, from which he recovered. There was no previous history of dysentery. On admission here he was expectorating hepatic pus. Several attempts were made to find the abscess by aspiration, but were unsuccessful. On the 11th October, 1898, pus was found by aspiration and an incision made in the 7th intercostal space; a portion of the 8th rib was excised. A large quantity of pus was evacuated, but it was felt that the incision only went into the pleura, into which the abscess was evidently draining. He improved somewhat after the operation, but on the 19th October violent hæmorrhage set in from which he died. Post mortem examination showed a large abscess on the upper part of the right lobe of the liver.

The other three cases of abscess of the liver were ordinary cases, and after incision and drainage, recovered. One of them was opened in the epigastric region as it pointed in front.

Ununited fracture of femur.

Sergeant Major C., 17th Lancers, who was shown in last year's report as "remaining," and who had been twice operated on for ununited fracture of the femur by having the fragments wired together, eventually made a good recovery, but had to be invalided from the service. Firm union took place in the broken bone after the second operation, with somewhat less than 2 inches of shortening; the knee and ankle joints were stiff from long continued confinement in fixation apparatus, but this condition was slowly becoming less with exercise and massage.

II.—Return of Invalids admitted into the Royal Victoria Hospital Netley, for Wounds and Injuries received in Action during 1897-98. By Col. W. F. Stevenson, Professor of Surgery, and Major W. Dick, Assistant Professor, Army Medical School.

Classification and Specification of Wounds and Injuries.	Commissioned Officers.				Warrant and Non-commissioned Officers and Men.				
	Admitted into Hospital.	Discharged to duty.	To Sick Leave.	Remaining in Hospital 31st October.	Admitted into Hospital.	Discharged to duty.	Otherwise.	Transferred to other Hospitals.	Remaining in Hospital 31st October.
I. Gunshot wounds of the head—									
1. Contusions and simple flesh wounds of scalp, severe.	—	—	—	—	1	—	1	—	—
2. With fracture of the cranium, with depression	—	—	—	—	1	—	—	1	—
II. Gunshot wounds of the face—									
1. With fracture	—	—	—	—	2	—	2	—	—
2. With lesion of the eyeball	—	—	—	—	3	—	3	—	—
3. With fracture of the lower jaw	—	—	—	—	2	1	1	—	—
III. Gunshot wounds of the neck—									
1. With injury of the trachea	—	—	—	—	1	—	1	—	—
1. With injury of the clavicle	—	—	—	—	1	1	—	—	—
IV. Gunshot wounds of the chest—									
1. Simple flesh contusions and wounds, severe ...	—	—	—	—	1	1	—	—	—
2. With injury of bony or cartilaginous parietes, without lesion of contents.	—	—	—	—	3	—	2	—	1
3. Penetrating, and ball lodged or apparently lodged.	—	—	—	—	1	—	—	1	—
4. Implicating contents	—	—	—	—	3	2	1	—	—
V. Gunshot wounds of the abdomen—									
1. Simple flesh contusions and wounds, severe ...	—	—	—	—	1	1	—	—	—
2. Penetrating or perforating, with lesion of kidney.	—	—	—	—	1	—	1	—	—
VI. Gunshot wounds of back and spine—									
1. Simple flesh contusions and wounds, severe ...	—	—	—	—	1	—	—	1	—
VII. Gunshot contusions and wounds of the perineum and genital and urinary organs, not being at the same time wounds of the peritoneum.	—	—	—	—	1	—	1	—	—
Gunshot wounds of the upper extremities—									
1. Simple flesh contusions and wounds, severe ...	—	—	—	—	6	2	2	1	1
2. With compound fracture of humerus	—	—	—	—	13	2	8	—	3
radius	—	—	—	—	3	—	3	—	—
ulna	—	—	—	—	3	1	2	—	—
ulna and radius ..	—	—	—	—	1	—	1	—	—
all three bones	—	—	—	—	1	—	1	—	—
carpus and metacarpus	—	—	—	—	1	1	—	—	—
phalanges	—	—	—	—	1	—	1	—	—
VIII. Gunshot wounds of the lower extremities—									
1. Simple flesh contusions and wounds, severe ...	4	—	4	—	14	9	1	3	1
2. With compound fracture of femur	1	—	1	—	12	—	8	—	4
tibia	—	—	—	—	10	4	3	—	3
fibula	—	—	—	—	1	1	—	—	—
tibia and fibula ...	1	—	1	—	5	—	4	—	1
all three bones	—	—	—	—	1	—	—	—	1
tarsus and metatarsus	—	—	—	—	6	2	3	1	—
phalanges	—	—	—	—	1	1	—	—	—
IX. Gunshot wounds with direct penetration or perforation of the larger joints. shoulder	—	—	—	—	2	—	2	—	—
elbow	—	—	—	—	4	—	4	—	—
wrist	—	—	—	—	1	—	1	—	—
knee	—	—	—	—	2	—	1	—	1
ankle	—	—	—	—	6	—	6	—	—
X. Sword and lance wounds of scalp, forearm and hand	—	—	—	—	1	—	1	—	—
scalp and face ...	—	—	—	—	1	1	—	—	—
Total	6	—	6	—	119	30	65	8	16

NOTES ON SOME OF THE CASES OF GUNSHOT WOUNDS.

Gunshot wounds ir officers.

Six officers were treated for gunshot wounds in the hospital during the year; four of these received their wounds in the campaign on the Indian Frontier of 1897–98, one in an expedition on the West Coast of Africa, and one at the battle of Omdurman.

Lieut. I., 1st Dorset Regiment, was wounded at the second taking of Dargai, in the Tirah campaign, the bullet passing through the muscles of the thigh at about the middle of the limb. The femur was not touched, nor did the bullet lodge. He was admitted at Netley on 23rd March; there were several open sinuses passing through the muscles of the thigh in different directions, and the cicatrices of others which had healed. The limb was very œdematous and painful, and there was a considerable amount of discharge from the open sinuses. Iodoform powder and dry gauze and wool dressings were used, the limb being placed on a back splint, and all the sinuses had healed in less than a month. When discharged from hospital on 4th April all the œdema had disappeared, but some stiffness of the knee remained in consequence of the matting together of the muscles on the flexor aspect of the thigh and the long-continued use of fixation apparatus.

Lieut. P., 1st Scottish Rifles, also wounded at Dargai, was admitted on 23rd March for a compound comminuted fracture of both bones of the left leg. The bullet had entered at about the middle of the shaft of the tibia on the inner surface. On admission here the fractures had firmly united, but the entrance wound remained open, and an almost black sequestrum, formed of a piece of the hard wall of the shaft of the bone which had been driven towards the medullary cavity, was visible at the bottom of it.

The sequestrum was removed by operation a few days after his arrival, and dry dressings applied, a splint being used to keep the limb at rest. The cavity in the bone filled up slowly, but about two months later more dead bone was recognised with a probe. This was removed by operation, and the cavity then left was filled with decalcified cancellous-bone tissue with excellent effect as regards the rapidity with which it filled up.

Skiagraphs of the limb demonstrated the presence of several pieces of the bullet, which had splashed in many directions, but were not in connection with the open wound, and they were not interfered with. The wound was soundly healed at the time of his discharge on 29th June, but the ankle and knee-joint were stiff from want of use and matting together of the muscles of the leg, for which he was recommended to employ massage.

Lieut. V. S., 5th Ghurkas, was wounded in the Tirah campaign, and was admitted here on April 21st. The bullet passed through the right femur, about 4 inches above the lower end, causing a severely comminuted fracture. At the time of his arrival at Netley both wounds had healed and the fracture was well united, but the knee-joint was very stiff from the prolonged use of fixation apparatus in the treatment of the fracture. A skiagraph of the seat of fracture showed the bones in good position and a large amount of callus deposited round it: shortening amounted to nearly 2 inches. The only treatment he required was massage, passive movement of the joint, and exercise, and with these means the movement of the knee rapidly improved.

We heard from him lately to the effect that the injured limb was as useful as the other, and that he could ride a bicycle.

Captain F., 1st Dorset Regiment, was wounded in the Tirah campaign, and was home on sick-leave from India. He was admitted here on 22nd July for the purpose of having a skiagraph of the limb taken and a lodged bullet removed if found. The bullet had entered at about the middle of the thigh on the outer surface, and passed directly inwards. A skiagraph showed the presence of the bullet, which was then localised by means of Mr. Mackenzie Davidson's apparatus in the usual way with two negatives: it was at a depth of 2½ inches from the skin on the outer and back surface of the thigh, and was readily removed through a 2-inch incision. The wound rapidly healed under dry dressings, without drainage, and he left hospital on 8th August quite well. The bullet was a Martini-Henry, and it was split at the point to a depth of ¼ of an inch, probably in consequence of having struck the officer's sword before entering

Lieut. R., of the West India Regiment, was wounded in the right thigh in an expedition on the West Coast of Africa. The bullet, which did not touch the bone, lodged in the limb, causing pain in walking, and he was admitted to Netley on 23rd September for the purpose of having it removed by operation. It was localised by means of Mr. Davidson's apparatus, two skiagraphs being taken, and was easily removed; it was encysted at a depth of 1½ inches from the skin on the outer side of the thigh, and was in the form of ¾ inch of an iron rod of about the diameter of a cedar pencil hammered sharp at one end. The wound healed rapidly, and he was discharged quite well on 10th October.

Lieut. H., of the Egyptian Camel Corps, was wounded in the left thigh at the battle of Omdurman. The injury was, at the time, supposed to have been caused by a fragment of shell, because a shell had exploded in his immediate neighbourhood at the time, and because the entrance wound in the skin was somewhat jagged. He was admitted to Netley on 4th October. On arrival here there was a sinus leading from the entrance wound, which was situated about 4 inches above the flexure of the knee, from which there was a considerable discharge of foul pus; the temperature ranged from 99·0° F. to 102·0 F., and the constitutional condition was one of distinct septicæmia. The sinus was so extremely painful and tender that it could not be examined with a probe. The history of shell wound was apparently so clear, and there being no suspicion that the fragment had lodged, our intention was to lay the sinus partly open and scrape it out. But before doing this operation, luckily, a skiagraph of the limb was taken which showed the presence of a bullet amongst the flexor muscles of the thigh, about 6 inches from the open end of the sinus in the direction of the tuber-ischii. Its exact position was not localised, because we felt certain that it would be found at the upper end of the sinus.

Under ether, the lower half of the sinus was laid open; the finger could then be passed to its upper limit, where two small cavities were discovered—one an abscess and the other containing the bullet, and separated by a V-shaped spur of tissue. The bullet was quite loose in the tissues, and was easily extracted with the long bullet forceps. The sinus track and both cavities were well scraped out with a sharp spoon. A drainage tube was used for a few days, and, on its removal, the wound rapidly healed. The patient was discharged on 5th November. The bullet was a Remington, and was split at the point, from which fact and the direction it had travelled—from below upwards—it was evidently a ricochet from the ground. Some shreds of clothing were also removed at the operation, and some had been discharged previously.

WOUNDS IN NON-COMMISSIONED OFFICERS AND MEN.

Gunshot wounds in the head.

There were two cases of gunshot wounds of the head, one of which occurred in India. This case seemed to be one in which the scalp only was implicated, but persistent headache resulted, and the man was invalided out of the service.

The other case was more interesting. A non-commissioned officer of the 1st West India Regiment was wounded in the operations on the West Coast of Africa. He had been trephined before he was sent home, but the wound did not heal, and dead bone was to be felt in it. The wound was situated on the vertex, in the parietal region to the right of the median line. The dead bone was cut down upon, when it was found there was some depression; seven small pieces of bone were removed. They were found lying on the dura mater under the margin of the wound in the cranium, made by the original operation of trephining. Prior to the removal of these pieces of bone, the man complained of severe headache. After the dead bone was removed the wound rapidly healed, the headache disappeared, and five weeks after the operation the man was transferred to Jamaica, practically recovered.

Gunshot wounds of the face.

Of the seven cases of this injury six were invalided out of the service, and one, with fracture of the lower jaw, returned to duty.

Private W. C., 2nd Yorkshire Light Infantry, was shot on the 29th January, 1898, at Shin Kamar Pass. The bullet was supposed to be a Lee-Metford, and the range was stated to be about 150 yards. The bullet entered at the right side of the nose, carrying away the cartilaginous ala; it split the upper lip, went through the upper jaw, knocked out the incisor teeth, and made its exit through the lower lip on the left side. It then entered the left pectoral muscles, and finally made its exit just behind the anterior border of the right axilla. On his arrival at Netley, on the 28th April, the wounds were healed, but on account of deformity he was discharged from the service as unfit. Expectant treatment was followed in this case throughout.

Private W. E., 1st Royal West Kent Regiment, was wounded at Inyat Kila, in the Mohmund country, on the 30th September, 1897. The bullet, which was supposed to be a Martini-Henry (range unknown), entered just below the left orbit, and made its exit just below the left mastoid process. There was marked facial paralysis of the left side. The senses of taste and smell were unimpaired. The treatment in India had been expectant, antiseptic dressings being used. On arrival at Netley on the 22nd January, 1898, both the wounds of entrance and of exit were open and discharging, the former being much the smaller of the two. Dead bone could be felt with the probe at the bottom of each wound. Both wounds were enlarged and the dead bone removed. Healing of the sinuses was very slow, and some small pieces of bone came away in the discharge. The paralysis remained permanent, and there was destruction of membrane of left ear; but eventually the wounds healed, and he was discharged unfit for further service.

Of the three cases in which there was lesion of the eyeball, the following is the most interesting, the man having been shot by three different bullets:—

Private G. F., King's Own Scottish Borderers, was wounded in the Bara Valley on the 13th December, 1897. No information could be obtained as to the kind of bullet, or the range. The first bullet entered in front of the right tragus, traversed the floor of the orbit, then went through the root of the nose, and emerged on the right side of that organ. The right eye appeared shrunken, but there was just perception of sight. Smell was lost. There was some injury to the temporo-maxillary articulation, as there was considerable difficulty in opening the mouth. In this case the wound of entrance was small; that of exit comparatively large. The second bullet entered in front of the upper third of the right thigh, and came out behind on the external aspect. This was only a flesh wound, and the apertures of entrance and exit were about the same size. The third bullet entered the front of the right wrist, passed through joint and carpus, and came out behind: both wounds had been large and ragged. A stiff wrist-joint was the result. Excision of cuneiform bone was performed, and on arrival at Netley on the 23rd March, 1898, the wounds were all healed. There was considerable inconvenience from epiphora. He was discharged unfit for further service.

Private A. E., Somerset Light Infantry, was wounded on the 9th August, 1897, at Shabkadar. The bullet was supposed to be a Lee-Metford, at about 400 yards. The entrance wound, which was very small, was situated in the lower part of the neck, 1 inch behind the posterior border of the left sterno-mastoid, passed under the tongue, and emerged just below the right angle of the mouth, fracturing the right ascending ramus and angle of the lower jaw; four teeth were carried away on the right side. Expectant treatment was adopted, and when he arrived at Netley on the 29th of March, 1898, the wounds were healed. He passed fit for duty.

Gunshot wounds o the neck.

There were only two of these, viz.:—

Private McP., Gordon Highlanders, wounded at Dargai on the 20th October, 1897. The bullet entered at sternal end of left clavicle, fracturing it and lodging at the root of the neck. It could not be found by exploration or by X-rays. When admitted to Netley on the 23rd March, 1898, the wounds were nearly healed. The bullet was localised by the X-rays near upper edge of 1st rib. No inconvenience was caused, and he was discharged fit for duty.

Sergeant M., Northampton Regiment, was wounded at Saraghari on the 13th December, 1897, probably by a Martini-Henry bullet. It entered at the inner end of the right clavicle, traversed the trachea, and emerged at the inner end of the left clavicle. The treatment for some time was expectant, but he had to be fed by the rectum. He was admitted at Netley on the 23rd March, 1898, with the wounds firmly healed, but he had to be invalided out of the service, as the injury to his trachea prevented him carrying out his duties as a bandsman.

unshot
ounds of
e chest.

Three cases of gunshot wounds of the chest were discharged to duty. One of these was a flesh wound caused by a Martini-Henry bullet at a range of 800 yards. The bullet lodged under the skin, and was removed. The other two perforated the chest and injured the lungs. The injury in one of these was caused by a Lee-Metford at short range, and in the other by a Martini-Henry at 40 yards. In neither was the bullet found. All three were perfectly convalescent on arrival at Netley, and required no surgical interference.

Three cases were invalided as unfit for further service, viz.:—

Private J. P., 7th Hussars, was wounded at Magundo's Kraal, Mashonaland, on the 19th July, 1897, the projectile being an iron slug, at comparatively close quarters. The slug entered the right side of the thorax at the angle of the 8th rib, and exploded two cartridges in his bandolier; it then passed forwards and lodged at the margin of the costal arch. This was removed, and found to have carried in a piece of nickel covering from one of the Lee-Metford cartridges which were exploded. Traumatic pleurisy afterwards developed, causing collapse of the right lung. The cicatrices were very large, and there was constant pain on the right side. For those conditions, although the wounds were perfectly healed on arrival at Netley, he was invalided as unfit for further service.

Private S. W., King's Own Scottish Borderers, was shot in the chest at Mamani, Tirah, on the 13th December, 1897, supposed to be by a Martini-Henry bullet, from a distance of 350 yards. The wounds, both of entrance and exit, were large. The bullet entered above the outer end of the right clavicle, and came out through the middle of the infra-spinatus fossa of the same side. It was stated to have gone through the lung. On arrival at Netley, on the 29th March, 1898, the wounds were perfectly healed. There were no lung symptoms, but the man was invalided because he had not good use of his right arm.

Private F. R., Northampton Regiment, was wounded at Saran Sar on the 9th November, 1897, by a Martini-Henry bullet fired from a distance of 60 yards. The wound of entrance, about the size of a shilling, was situated on the right side of the spine just behind the posterior border of the scapula; that of exit, which was much larger, was situated at the tip of the right acromion process. The spine of the scapula and the acromion were fractured. The wounds were quite healed on arrival at Netley; but the scapula was very much damaged and greatly impaired the use of the arm, on which account he was discharged as unfit for further service.

The man still in hospital was wounded at Saran Sar. He has two open wounds, one behind the posterior border of the left scapula (entrance) and the other near the left sterno-clavicular joint; from both of these small particles of bone continue to come away. There is no evidence of lung wound, although the course the bullet took, judged of by the position of the two wounds, would point to this.

The man transferred belonged to the West India Regiment, and was wounded on the West Coast of Africa. This case was skiagraphed here, and several pieces of metal could be seen in the chest. Operative interference was not deemed advisable. He was transferred to Jamaica.

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ounds of
e
bdomen.

Private P. C., Royal West Kent Regiment, was wounded on the 1st October, 1897, at Inyat Kila, Mohmund Country. The bullet, which was probably a Martini-Henry, entered the right arm, passed through it, then entered the body below the right false ribs, injured the right kidney, passed across the spine, and emerged in the left lumbar region. At first there was complete paralysis of the lower limbs, probably due to concussion of the spinal cord; no fracture could be detected. On arrival at Netley the wounds were completely healed, but the man was evidently very much shaken; and although the paralysis had passed off there was still pain and tingling down the thighs, and he was accordingly invalided as unfit for further service.

Extractio bullet.

Lance-Corporal E., 1st Gordon Highlanders, received a bullet wound of the thigh and abdomen at the second attack on Dargai, and was admitted at Netley on 23rd March. The bullet made three skin wounds, an entrance wound at the apex of Scarpa's triangle, an exit just below the middle of Poupart's ligament, and then a second entrance aperture close above the ligament, passing apparently into the abdomen; no special signs of abdominal injury presented themselves during the treatment of the case, nor was there any injury to bone. On admission here there was an open sinus in the groin leading towards the brim of the pelvis, but the bullet could not be perceived with a probe; there was a free discharge, the temperature was normal, and the man was in good general health. A skiagraph was taken, and the bullet was seen to be lying on the brim of the true pelvis, the front part of it overhanging the pelvic cavity. The precise position of the bullet was ascertained, by means of the localiser, to be near the left sacro-iliac synchrondrosis, 5½ inches from the sinus-opening at Poupart's ligament, and 3½ inches from a point on the skin of the abdomen vertically over it. An operation for the removal of the bullet was performed on 10th May; the sinus was laid open for about an inch, and the track dilated with the finger and by expanding within it a strong pair of sequestrum forceps. Pratt's telephone bullet-detector demonstrated the presence of the missile in the position already defined; it was lying loose in a cavity somewhat larger than itself, and was extracted with the long bullet-forceps. Drainage was employed for a few days, and the wound healed under dry dressings in less than 5 weeks. The man was discharged to duty on 23rd June. The bullet was a Snider, and had a small piece of tin let into a cut in the point.

Gunshot wound of back and spine.

The only instance of this kind of wound occurred in a man of the West India Regiment, who was wounded on the West Coast of Africa. The bullet entered and lodged in the back; no bones were broken. He was admitted into Netley Hospital on the 28th June, 1898. The bullet was localised by the Röntgen rays, and on the 1st August, 1898, it was removed by a flap incision. It was a piece of iron, hammered into the shape of a round bullet, and was found lying ¾ of an inch deep between the crest of the right ilium and the spines of the sacrum. For some reason, after the wound had healed, an abscess formed in the cavity left by removal of the bullet. This was evacuated, and then rapid recovery took place. Later on bronchitis developed, and he was sent to the medical wards. After recovery he was transferred to Jamaica.

Gunshot wounds o the genit system.

The patient, a Gordon Highlander, was wounded at Dargai on the 20th October, 1897. The bullet entered the left side of the scrotum injuring the right testicle, emerged, and then entered and lodged in the adductor muscles of the right thigh. It was extracted; and the patient states that it was a Martini-Henry. The wounds were healed on arrival in this country, but pain remained in the testicle. The patient was also injured by a second bullet, which struck his right hand, and resulted in stiffness of the fore and middle fingers of that hand. This condition, together with the pain in the testicle, caused him to be invalided as unfit for further service.

Gunshot wounds o the uppe extremiti

There were 6 severe flesh wounds, without injury to bone. Of these two were discharged to duty, being perfectly healed. Both were caused by Martini-Henry bullets. Two were discharged unfit for further service. Both were injured in the region of the elbow-joint, and there was considerable interference with movements, although the joint itself was not wounded. One case, a non-commissioned officer in the West India Regiment, was transferred to Jamaica, but will eventually be fit for duty. The wound in this case was caused by a piece of iron. The case remaining was from Egypt, it was caused by a Remington bullet, and will shortly be discharged fit for duty.

Of the 23 cases received into this hospital with compound fracture of the bones of the upper extremity, 4 have been discharged to duty, 3 remain, and 16 have been invalided. Of the fit cases two were fractures of the humerus.

In one a Lee-Metford bullet, at 400 yards, had fractured the bone at the insertion of the deltoid; in the other, the kind of bullet not being known, there was a longitudinal fracture of the humerus, with some separation, united by bony callus at the upper part. A skiagraph of this case was taken showing the condition. A third case, discharged fit, had had the metacarpal bone of the little finger of the right hand removed for compound fracture of that bone, scarcely interfering with the usefulness of the hand. In the fourth case the man had been three times shot: first, he had been hit in the ammunition pouch, which knocked him down, but did not injure him; second, a bullet from a muzzle-loading gun entered his forearm and fractured the ulna (a skiagraph was taken of his left forearm, which showed several small pieces of lead still in the tissues); third, whilst stooping he was shot in the left groin by a Martini-Henry bullet, which was extracted just above the left external abdominal ring. All these cases were healed, and practically fit for duty on arrival at Netley. Of the three patients still remaining in hospital one was wounded at the Atbara, and the other two on the Indian Frontier. In one the surgical neck of the humerus was grooved, and the bullet lodged in the latissimus dorsi, from which it was removed in Egypt. In another a piece of the humerus has come away, leaving a gap which has united by a narrow bridge of bone; a sinus still remains, from which small pieces of bone continue to come away. This man was put under chloroform at Netley, the wound opened up, and a few pieces of bone removed. He took chloroform badly, and during the operation artificial respiration had to be resorted to; while this was being done the humerus broke where this narrow union had taken place. This has now again united, but still small fragments are being discharged from the wound. The third case had a compound comminuted fracture of the left humerus, of so severe a nature that amputation of the upper arm was performed within 24 hours. He has now a very good stump with about 4 inches of humerus left. The stump is perfectly healed, and he is only waiting for an artificial arm.

All three cases will eventually be discharged as unfit for further service.

Eight cases of compound fracture of the humerus were discharged as unfit for further service; in four of these amputation was performed.

Private A. O., East Kent Regiment, was wounded on the 20th September, 1897, in the Mohmund Valley, probably by a Martini-Henry bullet, which entered the humerus near its upper end. Amputation was performed at the left shoulder-joint. He arrived at Netley on the 17th February, 1898; at this time there was a sinus, from which several small pieces of bone were afterwards extracted.

In one case amputation was performed a month after the wound, in the middle of the upper arm, on account of suppuration and want of union of the fragments. This case did well, and was quite healed on arrival at Netley.

In the remaining two cases amputation was performed within twenty-four hours of the receipt of the injury; both cases seem to have recovered rapidly, as they were healed on arrival at Netley. One, however, had considerable neuralgic pain in the stump, an abscess formed, and six weeks after his arrival at Netley the abscess was opened, and a Dum-Dum bullet extracted. After this the pain disappeared.

In the remaining four the arm was saved. One was completely healed on arrival at Netley; the other three had sinuses, from which pieces of bone were removed after arrival home. The most interesting is Private W. H., Yorkshire Light Infantry, who was wounded at Shin Kamar Pass on the 29th January, 1898. The bullet (variety unknown) entered the left upper arm, close to the posterior fold of the axilla, and came out in front close to the coracoid process, causing a compound comminuted fracture of the humerus below the head of the bones. The upper third of the bone was excised, leaving the head in the glenoid cavity. This was done by a long anterior incision. On arrival at Netley, 28th April, there was still a sinus with a few small pieces of dead bone; this, however, healed up. His condition was then that he had a flail-like arm with little power. This, however, to a certain extent was remedied by an artificial apparatus.

There were three cases of fracture of the radius, all of which were invalided.

One of them had lost power in the hand, evidently from injury to the median nerve.

Two cases of fracture of the ulna were discharged as invalids, one of them having lost much of the tissue of the extensor muscles, and the other for almost the same condition.

The case of fracture of the radius and ulna necessitated amputation above the elbow-joint. Some sinuses were scraped on his arrival at Netley, after which he got an excellent stump.

The case of fracture of all three bones also necessitated amputation above the elbow-joint; this was stated to have been caused by a Lee-Metford bullet, and the bones to have been extensively shattered. The stump was healed on arrival home.

In the case of fracture of the phalanges, amputation of the ring and little fingers of the right hand had been performed in India. On arrival home there was stiffness of the other fingers, and a piece of bullet was felt to be in the palm; this was extracted at Netley in April, but the man was eventually invalided on account of the condition of the hand.

Gunshot wounds o the lower extremiti

Amongst non-commissioned officers and men 14 had severe flesh wounds of the lower extremity. Of these 9 were discharged to duty, 8 of them being from the Indian frontier and 1 from the Atbara; they were all healed on arrival home. 1 man was invalided; he was wounded in the Tirah Expedition on the 20th October, 1897, the bullet entering on the outside of the thigh and coming out close by the anus on the right side. He lost the power of flexion of the right leg, and considerable wasting of the muscles of the limb took place. One man remains; he has a flesh wound in the left buttock, received at the Atbara on the 8th April, 1898. The bullet (a Remington) was removed in Egypt on the 31st May. He was admitted here on the 6th October and is doing well, and will probably be discharged fit for duty. The three men transferred to other hospitals were wounded on the West Coast of Africa. They belonged to the West India Regiment, and they were transferred to the depôt in Jamaica.

Of 12 compound fractures of the femur, 8 were invalided and 4 still remain in hospital. In 5, amputation of the thigh was performed in India; in 7 conservative surgery was adopted. In none of them did the man recover sufficiently to return to duty.

Private G. C., East Kent Regiment was wounded on 20th September, 1897, the femur being fractured in its upper third. Amputation was performed just above the fracture. The stump was perfectly healed on his arrival at Netley on the 22nd January, 1898.

Private W. B., Gordon Highlanders, received a bullet wound at Dargai 18th October, 1897, fracturing the upper part of his right femur. He made an excellent recovery, with 1 inch shortening.

Piper J. K., Gordon Highlanders, was shot on the 15th November, 1897. The bullet, which was stated to be a Martini-Henry, entered on the posterior and outer aspect of the left thigh, just above the knee, travelled upwards, and emerged at a higher level on the anterior and inner aspect. An attempt to save the limb was made; but on the 27th December, 1897, as there was great comminution and no sign of union, amputation was performed. On arrival at Netley, on the 23rd March, 1898, the stump was firmly healed.

Private W. W., Yorkshire Light Infantry, was wounded on the 25th October, 1897. The right femur was smashed. The limb was put up in splints, and the man gradually moved rearwards until he was admitted into No. 1 British General Hospital on the 23rd December. There was then very considerable suppuration, and on examination the femur was found to be greatly comminuted. The thigh was amputated in its upper third the following day. Four days afterwards there was secondary hæmorrhage. This was arrested, and the man made a good recovery. When admitted into Netley Hospital at the end of March, there was still a sinus in the stump. The stump was injured by a fall while in this hospital, but ultimately healed.

Sergeant A. L., Northampton Regiment, was shot on the 9th November, 1897, at Saran Sar. The bullet passed through fracturing the left femur above the condyles. Three weeks after the injury amputation was performed in the upper third. On arrival at Netley on the 16th April, 1898, there was still a sinus, which continued to discharge. Erysipelas attacked the wound in July, 1898. After he recovered from this, on the 16th August, the stump was opened up, and some necrosed bone removed. After this he made a rapid recovery.

Private T. M., Gordon Highlanders, was wounded at Dargai on the 18th October, 1897; the bullet passed from back to front in the lower third of the left thigh, fracturing and comminuting the femur in its passage. It was a Snider fired from about 500 yards. Great suppuration ensued, and accordingly, on the 30th December, the thigh was amputated in the upper third. On arrival at this station in March there were numerous sinuses, which obstinately refused to heal; abscesses also from time to time formed in the stump. The cicatrix was opened up on the 16th August, and all sinus tissue scraped away. After this he made a rapid recovery. It is stated that at the amputation several fragments, together with the clay plug, of a Snider bullet, were removed.

Private G. A. W., West India Regiment, was shot in the left thigh on the West Coast of Africa on the 3rd March, 1898. Incisions had been made for removal of the bullet. He arrived at Netley on the 28th June, 1898. There was then a discharging sinus on the outside of the left thigh just above the knee-joint. A week after arrival he was put under chloroform, and an incision made over the sinus; a hole into the external condyle was found, and out of this a square piece of cast-iron was removed. The sinus has not yet healed, and he still remains in hospital.

Private J. B. H., Gordon Highlanders, was wounded on the 12th December, 1897, in the Bazar Valley, and admitted into the hospital at Nowshera on the 20th December. The bullet entered the back of the thigh, about 4 inches above the knee-joint. The femur was fractured; the bullet (a Snider) was extracted in this hospital. A great deal of suppuration has followed. The patient came home, and was admitted to Netley 6th October, 1898. There was then considerable discharge from the wound, and there was a large abscess on the inside of the limb just above the knee. This has been incised, and it was found that the femur had united with about 1¼ inches shortening; a Volkmann's sharp spoon could be put right through the femur from one side to the other. The patient is doing fairly well, and still remains in hospital.

One man, who had a compound fracture of the left thigh received in action in Tirah in December, was discharged fit for duty in May, 1898. In this case the bullet was lying on the inner side of the femur. It was skiagraphed and located, but as it caused no inconvenience it was not removed. This man has been readmitted for some periostitis over the old fracture. This has been operated on. He will probably eventually be invalided.

Four cases of compound fracture of the tibia were discharged fit for duty. The following is interesting:—Private G. W., West Surrey Regiment, was wounded at the Sampagha Pass. The bullet entered the left leg, over the front of the tibia. Several pieces of bone were taken away. He arrived home in March. The wounds healed, but a piece of lead could be felt in the tibia. On 31st May this was cut down upon, and found to be firmly embedded in the bone. It was chiselled out, and the cavity left filled with decalcified bone. An excellent recovery was made without any depression in the bone.

The three cases discharged otherwise had all more or less important sequelæ; thus two of them had a considerable amount of lameness, whilst the third, who had been shot in both legs at Dargai, had complete loss of the power of flexion in the left leg, due to the nerves having also been injured.

Three cases still remain in hospital. Of these one will be discharged fit for duty. Another who was wounded at the Atbara, will be discharged unfit on account of deformity and want of power in the limb. The last case is that of Private C. W. G., 7th Hussars, who was wounded on the 16th July, 1897, at Fort Charter, Mashonaland. The left tibia was shattered, and amputation at the knee-joint was performed the next day on the field. He was then transferred to Salisbury; but the stump did not do well, and here a second amputation was performed on the 24th September, in the middle of the thigh. It is stated that several sinuses formed in the stump, and continued to discharge for a long time. Shortly after his arrival at Netley in July, 1898, these sinuses all healed, and he is now only waiting to be fitted with an artificial limb prior to his being invalided.

There was only one case of fracture of the fibula alone. The man was wounded at Saran Sar; came home perfectly recovered and was discharged to duty. The wound is stated to have been caused by a Lee-Metford bullet.

Four cases of fracture of the tibia and fibula were invalided: two of them had primary amputation performed below the knee; they had become quite convalescent on arrival at Netley. In the remaining two conservative surgery was practised. The following is the history of—

Piper G. F., Gordon Highlanders, who was wounded at Dargai on the 20th October, 1897. The bullet (stated by the man to be a Martini-Henry, fired at 50 yards) entered the outside of the right leg above the ankle and came out on the inside, nearly at the same level; both bones were comminuted. A large fragment of bone was removed from the inner wound, and several small pieces from the outer one. On the 22nd November erysipelas attacked the wounds, and on the 27th a portion of stocking was removed from the wound. The erysipelas subsided about the 2nd December, after which the wounds rapidly healed. On arrival at Netley on the 23rd March the wounds were in a state of superficial ulceration: the fractures had united, but there was a good deal of thickening just above the ankle-joint; there was some pain, and the man walked very lame. On the 17th May, 1898, he was invalided, being unfit for further service.

The man still in hospital only arrived home on the 30th October. The wounds are open and there is some dead bone which will require removal. He will eventually be invalided out of the service.

In the case of fracture of all three bones amputation was performed secondarily at the junction of the middle and lower thirds of the right thigh. He also had a fracture of the spine of the right scapula, caused by a second bullet. He still remains in hospital.

Three patients who had compound fractures of the tarsus and metatarsus were discharged as unfit for further service: one of these had his left great toe and 1st metatarsal bone removed. The other two had considerable lameness from necrosis of the tarsal bones, and ankylosis of the tarsal joints. One case was transferred to the depôt of the West India Regiment at Jamaica. The other two cases recovered sufficiently to be discharged fit for duty.

There was one case of compound fracture of the phalanges, viz.:—

Private S. V., Dorset Regiment, who was wounded at Saran Sar on the 16th November, 1897, under circumstances in which he displayed great bravery and for which he received the Victoria Cross. He was wounded in the 1st and 2nd toes of the right foot. At the time this was thought to be a sword cut. The wounds healed, and he was invalided home, arriving here on the 28th April, 1898. On arrival there was a discharging sinus leading down to the ungual phalanx of the great toe, and there was felt to be considerable thickening of the bone. On the 24th May the bone was cut down upon; a cavity was found, and in it a portion of the nickel covering of a Lee-Metford bullet, thus proving that the injury was caused by gunshot. The cavity was scraped out, and he then rapidly got quite well. On the 16th June, 1898, he was discharged fit for duty.

Gunshot wounds of larger joints.

There were two cases of gunshot wound of the shoulder-joint. In both cases the joint was excised in India. The following is the more interesting of the two:—

Private J. H., Devonshire Regiment, was shot at Mastura, Tirah, on the 29th October, 1897. The bullet entered in front of the left shoulder-joint and lodged: the head of the humerus was split longitudinally into the joint. On December 1st the shoulder-joint was excised, and a Martini-Henry bullet removed. The man states that he was fired at from 800 yards. He arrived at Netley on the 21st April, 1898. There was only then to be seen the long linear cicatrix of the excision. The man had fairly good movement in the joint.

There were four cases of gunshot wounds of the elbow-joint. In the following case amputation of the upper arm was performed:—

Private W. F., Northampton Regiment, was wounded on the 16th

November, 1897, at Maidan. A Snider bullet entered the back of the right elbow-joint by a small sharply defined wound, and was extracted at the lower and inner side of the upper arm. The wound suppurated freely, and much pus was evacuated by incision. He grew worse, and on the 10th December a long posterior incision was made with the object of removing dead bones and resetting the joint. The humerus and ulna were found, however, to be so extensively shattered that this was abandoned. The following day the limb was amputated, 3 inches above the elbow, by modified circular operation. He arrived at Netley 29th March, 1898: he then had a small sinus, which was scraped, and then healed.

The other three cases had their elbows excised at Netley. They are commented on in the report on operations.

The patient, with gunshot wound of the wrist-joint, was Lance-Corporal T. O., Northampton Regiment, who was wounded in the Maidan on the 9th November, 1897. The bullet, which was stated to be either a Lee-Metford or Dum Dum, entered above the styloid process of the right ulna, traversed the wrist-joint, and emerged between thumb and index finger, causing great destruction of bone in its passage. The limb was at first conservatively treated, but did badly, and on the 11th December, 1897, amputation was performed in the middle of the right forearm, resulting in a very good stump. He arrived at Netley on the 16th April, 1898, the stump being then healed. Later on a small abscess formed in the stump, and a piece of necrosed bone was removed. This healed up, and he was ultimately invalided out of the service. He was supplied with an artificial arm.

There were two cases of gunshot wound of the knee-joint, one of whom had the knee-joint excised:—

Private P. C., King's Own Scottish Borderers, was wounded on 23rd November, 1897, at Bagh. The projectile, which was from a sporting rifle, at long range, entered the front of the right knee-joint and lodged. Extensive suppuration round the knee-joint ensued. On the 9th December the knee-joint was excised. Considerable œdema of the limb followed the operation; and in the beginning of February thrombosis of the femoral vein took place, but the man recovered under treatment. When he arrived at Netley on the 21st April, 1898, firm fibrous ankylosis of the joint had occurred, with very slight antero-posterior movement, and 1½ inches shortening of the limb. The man was fitted with special boot, and invalided.

The other case was Private C. W., Cameron Highlanders, who was wounded at the Atbara on the 8th April, 1898. The bullet, which was fired from about 20 yards' distance, passed right through the joint, causing great destruction of bone. It entered on the outside of the left knee-joint, and passed out on the inside. Free incisions into the joint were made, the loose pieces of bone removed, and the head of the fibula excised. Firm ankylosis had taken place when the man arrived at Netley on the 19th August, with about 1½ inches shortening. He has been fitted with a special boot, and will be invalided as unfit for further service.

In six cases the ankle-joint was injured by bullets: all of these resulted in amputation of the limb, five being operated on in India and two at Netley. Five of these were amputations through the leg and one through the thigh on account of severe injury to the whole limb below the knee. None of the amputations done in India for this injury were primary.

Private R. B., Royal West Kent Regiment, was shot on the 30th September, 1897, at Inyat Kila; the bullet was supposed to be a Snider, and the range about 50 yards. It entered the inner side of the right ankle, just below the malleolus, and passed out below the outer malleolus. In India several pieces of bone were extracted. The sinuses connected with the wounds of entrance and exit continued to discharge. On admission to Netley on the 23rd March, 1898, both wounds were open, and discharging. The probe could be passed through the ankle-joint, necrosed bone being felt, the joint being ankylosed in a very faulty position, and the toes very much pointed. The discharge was evidently exhausting the man, so it was determined to amputate the foot. This was accordingly done on the 6th June in the lower third of the leg by a long posterior and short anterior flap, the posterior tibial nerve being dissected out. The man made a rapid recovery; was fitted with an artificial limb, and discharged from the service.

The other amputation performed at Netley was in the case of Private T. M., Dorset Regiment, who was wounded in the right ankle at Dargai on the 20th October, 1898. His case was almost identical with the case above cited; and the same amputation was performed. He also had a gunshot wound of the fleshy part of the left upper arm, which was healed on arrival at Netley.

Private J. R., Yorkshire Light Infantry, was a similar case, having been shot in the left ankle at Shin Kamar, Tirah, on the 29th January, 1898. Conservative treatment was tried; he was, however, in such a bad condition on his arrival at Deolali that his leg was amputated by the same operation as above described, on the 29th March. On arrival at Netley, the stump was quite healed, and he was fitted with an artificial leg.

Private G. B., 1st Dorset Regiment, was wounded at Dargai by two bullets: one entered over the inner malleolus, passed through the left ankle-joint, completely disorganising it; another bullet passed through between the bones of the same leg, about 4 inches higher. The progress of the case was unsatisfactory, as suppuration occurred in the wounds, and he had one or two attacks of secondary hæmorrhage. On the 11th November, 1897, the leg was amputated by lateral flaps, just above its middle, at Rawal Pindi. After this the man made an uninterrupted recovery; and on arrival at Netley on the 29th March, 1898, the stump was quite healed, and he was fitted with an artificial limb.

Private W. C. A., Northampton Regiment, was wounded on the 9th November, 1897, at Saran Sar, by a Martini-Henry bullet, at 150 yards' range. The bullet entered behind left ankle-joint, fractured tibia and fibula into the joint, and emerged in front. The limb did badly, and was amputated at the seat of election on the 12th December, 1897. The flaps united, but sinuses formed. On arrival at Netley, in April, these sinuses were still open, but they rapidly healed, and he was fitted with an artificial limb and discharged.

In the following case there was shattering of the limb below the knee as well as wound of the ankle-joint, which caused the amputation to be done so high up:—

Sergeant A. W. M., Dorset Regiment, was wounded at Dargai on the 20th October, 1897; the bullet was found to be a Snider, and the range between 400 and 500 yards. The bullet entered the inner side of the left leg below the knee, travelled to the ankle-joint, and lodged below the external malleous; both bones of the leg were fractured. The limb did not do well, and on the 21st November it was amputated in the lower third of the thigh at Rawal Pindi. After the amputation the end of the femur protruded, and 2½ inches of it were removed on the 31st January, 1898. After this the stump did very well. On his arrival in England, at the end of April, the stump was quite healed, and firm. He was fitted with an artificial limb, and discharged from the service.

Sword and lance wounds.

Out of the total number of wounds treated here only two were sword-cuts. One of these went out fit for duty and one was invalided.

The man who was invalided had a cut on the scalp exposing the bone, another cut on the fore-arm, and a third across the palm of the left hand, severing the tendons. This last, although the tendons had been sutured, caused loss of power of flexion in the hand, and was the immediate cause of his being invalided.

The other man was wounded whilst on baggage guard in the Tirah. He had three cuts, viz.:—1st, extending from the left ala nasi, over the right eyebrow, and into the right frontal region; 5 inches in length; this evidently only divided scalp tissues. 2nd, an oblique cut higher up in the frontal region, about 2 inches in length, not implicating the bone. 3rd, a cut about 2½ inches in length on the right side of the head, following the line of the right fronto-parietal suture. This is stated to have penetrated the skull, and to have rendered him unconscious for some time afterwards. All the wounds were healed on his arrival at Netley, but there was a well-marked depression in the bone corresponding to the 3rd above described wound. The man made a perfect recovery, and was discharged fit for duty.

APPENDIX No. III.

TWO CASES OF HEPATIC ABSCESS; WITH CLINICAL REMARKS.

By Colonel K. McLeod, M.D., LL.D., I.M.S. (retired), Professor of Clinical and Military Medicine, Army Medical School, Netley.

The following cases, which recently occurred in the Royal Victoria Hospital, Netley, illustrate several important points in the natural history, diagnosis and treatment of abscess of the liver.

Case No. 1. *Hepatic abscess evacuating through left lung; repeated explorations; signs of rupture into right pleura; drainage; secondary hæmorrhage; death.*

Sergeant Farrier J. E. H., 11th Hussars; æt. 27; service—home $3\frac{8}{12}$, Indian (Punjab) $5\frac{3}{12}$, total $8\frac{11}{12}$; invalided 17th January, 1898; left India 6th March, 1898; admitted Netley, 20th March, 1898. Character, regular and exemplary.

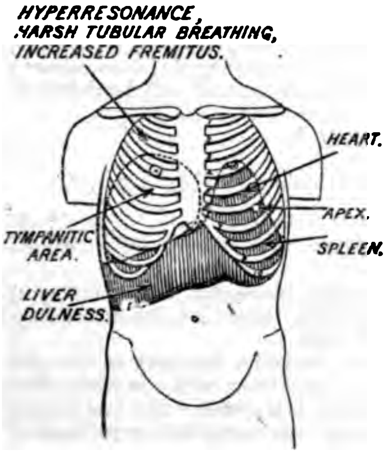
His medical history sheet does not indicate any important illness until November, 1896, when, at Sialkot, he was admitted into hospital for a smart attack of ague which detained him for 17 days. He suffered from diarrhœa in the same station and year, but the symptoms were not so severe as to compel him to report himself sick. On the 24th of July, 1897, he was admitted at Sialkot for pneumonia affecting the lower lobe of the right lung, and was discharged to duty after 19 days' detention. His regiment being ordered to the front, he marched to Rawal Pindi, and there received orders to shoe the horses' hind feet. He received some blows on the right side while executing this duty, which were followed by pain, and a few days afterwards, whilst at work, he suddenly spat up about a quart of blood and pus. This eased his pain and he continued to work for a week, when, the spitting persisting, he sought admission into hospital on the 4th of October, 1897. His case was diagnosed to be a hepatic abscess, evacuating through the lung. He admitted at this time having been in the habit of occasionally drinking hard. The symptoms subsided and expectoration ceased, and he was discharged to duty on the 24th of October. In November he had a return of pain in the right side accompanied by fever, and on the 20th of that month profuse expectoration of purulent matter took place. This has persisted since that time.

On admission, at Netley, he was found to be very emaciated and anæmic. He spat up large quantities of fœtid chocolate-coloured material and suffered from fever of a hectic type. On seven occasions his liver was explored by means of an aspirator at different situations and levels; but no indications of pus were discovered. The last exploration high up, drew some clear serous fluid which was judged to have come from the cavity of the right pleura.

On the 4th of October, 1898, Mr. Curme made a careful physical examination with the following results:—Heart displaced, somewhat downwards and outwards; lower two-thirds of right lung absolutely dull in front and behind, with suppressed resonance and fremitus and respiratory sounds; left lung hyper-resonant with puerile respiration; expectorating between three and four pints a day of chocolate-coloured viscid fluid containing pus and mucus, and very fœtid; breathing shallow and hurried; pulse small, soft, and rapid; liver dulness extends about two inches below costal arch;

temperature from 100° to 101° F. During the 5th, 6th, and 7th his condition underwent no change. On the 8th there was a suppression of expectoration up to 12 noon, and free emission of the usual material afterwards. On the 9th, the expectoration was scanty, clear, and muco-purulent; temperature higher; dyspnœa; pulse smaller and more rapid.

On the 10th, expectoration still scanty and clear; dyspnœa and palpitation distressing; aching pain over right side. Heart greatly displaced to left; apex beat in 6th interspace, 3½ inches below nipple and 2 inches external to it, action tumultuous, impulse and sounds diffused, pulse 126. Liver dulness extends to near level of umbilicus; spleen enlarged. Tympanitic resonance from second to sixth rib arteriorly, extending to mid axillary line laterally; absolute dulness over rest of lung posteriorly; level of dulness altered by changing position. Resonance and vocal fremitus exaggerated superiorly, suppressed inferiorly; respiration harsh at apex, faint and distant or absent elsewhere. Left lung the same as before, respirations 88, shallow. The accompanying diagram indicates roughly the conditions observed on the 10th of October, from which, in conjunction with the general symptoms, the inference was drawn that the abscess had broken into the right pleura, the lower two-thirds of the cavity being filled with pus and air, and the upper third shut off by adhesions. Direct drainage through the chest wall was, therefore, deemed advisable to relieve symptoms and permit of free discharge of pus and obliteration of the abscess cavity. Accordingly, the patient was transferred to the surgical division, and on the 11th, Major Dick, after the man had been anæsthetised with chloroform, introduced an aspirator needle for the purpose of exploration, through the 7th inter-space in the mid axillary line. After the instrument had entered about an inch and a half, a free discharge of grumous fœtid pus took place. A free incision was made and an inch of the seventh rib removed. Large quantities of dark brown material flowed forth. The finger entered a spacious cavity, with smooth irregular walls; but no aperture in the diaphragm could be detected. The later discharge was thicker and more like liver pus. Two large drainage tubes were inserted, and a voluminous antiseptic dressing applied. It was observed after the operation that both heart and liver had resumed their natural positions.



The operation was followed by decided relief. The temperature fell, the breathing became easier and heart's action steadier. The patient was able to sleep, and felt altogether much more comfortable. The discharge continued for a few days to be very copious and putrid, but became on the 14th less grumous and fœtid. He had a slight attack of diarrhœa on the 17th and 18th which was checked by opium and astringents. On the 18th he had a subnormal temperature, and on the 19th there was pain in the right side, and no discharge on the dressings. The tubes were withdrawn and found to be blocked with slough. They were cleared and reintroduced without trouble. Shortly after hæmorrhage set in which proved quickly fatal.

A post mortem examination was performed on the 21st by Captain Lamb, I.M.S., who kindly supplied the following notes:—*Rigor mortis* well marked; body fairly well nourished; a wound 1¼ inches long on right side of chest in mid axillary line, corresponding to 7th interspace. On opening the thorax, *right lung* found to be adherent to the pericardium to a slight extent, and for a considerable distance around the above-mentioned wound there are strong fibrinous adhesions; on breaking these down a large cavity is opened involving the lower lobe of the lung; this is full of blood-stained pus, with a considerable amount of clot and broken down lung; the cavity involves the whole of the lower lobe of the lung; the upper part of the pleural cavity completely shut off by strong fibrinous adhesions.

Left lung and pleura healthy.

Pericardium contains about $2\frac{1}{2}$ ozs. of clear fluid; the *heart* is somewhat flabby, but otherwise healthy. The upper surface of the right lobe of the *liver*, the diaphragm over this, and the inferior surface of the lower lobe of the right lung is firmly adherent together. On cutting into the liver towards the upper and back surface of the right lobe, an abscess cavity about the size of a tangerine orange is opened into; it is full of inspissated thick pus which is neither bile nor blood-stained; the cavity is limited all round by a very thick membrane, honeycombed on its inner surface. Between this cavity and the thickened layer which binds the lung and liver so firmly together, a thin layer of liver tissue can be dissected off, and no communication of any kind is detected between this cavity and the cavity of the lung. The lung cavity, as previously mentioned, involves the whole of the lower lobe; its walls are rugged and numerous; bronchioles open into it; no opening into any artery can be detected. Liver generally is slightly enlarged, pale and mottled.

Spleen is very dark and considerably enlarged.

Kidneys healthy.

Intestines. No ulcer or cicatrix is found in either small or large gut.

Case No. 2. *Enteric fever; right pleuro-pneumonia; evacuation of 24 ozs. of serum from right chest; rupture of hepatic abscess into right pleura; death.*

Private C. R., R.I. Fusiliers, æt. 22; service—home $2\frac{5}{12}$; foreign (Egypt) $\frac{7}{12}$; total, 3 years. Invalided from Alexandria, 1898. Admitted 20th September, into Netley Hospital, 3rd October, 1898.

He was admitted into hospital from the Mustapha Barracks on the 15th of July, 1898. His case was diagnosed as enteric fever, which is reported to have run a prolonged course "with the usual symptoms." He was greatly debilitated. He improved slightly on the voyage home, but complained of pain in the right side.

On admission, he suffered from cough, pain in upper part of right chest and tenderness in right groin. He was very weak and emaciated. On examination the right chest was found to be dull to percussion below the level of the nipple in front and behind. Left lung hyperresonant. Heart displaced downwards and outwards. Liver dulness extended about 2 inches below costal margin. Sputum copious of a chocolate-brown colour, viscid and almost odourless. Temperature of a hectic type. Diarrhœa troublesome. On the 9th of October, the signs pointing to pleuritic effusion, the right chest was aspirated by Major Dick in consultation with Lieut. Col. Webb, and 24 ozs. of clear, straw-coloured fluid were removed.

The operation was followed by considerable relief, but the tenderness of lower chest and right groin persisted. On the 13th of October, it was noticed that the cough was not so troublesome and that the character of the expectoration had altered—had become clearer and lost its brown tinge. On the 17th, pain in the hepatic region was acute, and some blood was passed with the stool, the diarrhœa continuing. On the 21st, a decided change for the worse occurred. The hepatic tenderness was more marked, and the liver dulness had descended. There was also some œdema of the hepatic area, and the sputum had resumed its previous character. Abscess of the liver was now suspected, and exploration proposed; but the patient firmly resisted any operative interference. His condition grew rapidly worse, and he sank of exhaustion on the morning of the 23rd of October.

A post mortem examination was performed on the forenoon of the 26th by Captain Lamb, from whose notes the following facts are abstracted:—

External appearances.—*Rigor mortis* gone; body fairly well nourished; considerable bulging of right side of chest which is absolutely dull on percussion from the clavicle to below the costal margin.

Thorax.—On opening right thorax, a large quantity of dark purulent matter escapes; the right pleural cavity is distended with this material, Right lung completely collapsed and pushed to the back of the cavity which communicates by an opening in the diaphragm, about the size of a crown piece, with a large cavity in the right lobe of the liver. The wall of the pleural cavity is irregular and ragged, and is partly constituted by the middle lobe of the lung, which is deeply excavated, several bronchioles opening into the cavity ; pleural membrane thickened. Upper and lower lobes collapsed and flattened and sink in water.

Left pleura free from adhesion ; lung slightly œdematous. Pericardium contains fluid ; heart pale and flabby, otherwise healthy.

Abdomen.—Liver considerably displaced downwards ; right lobe excavated by a large abscess cavity about the size of a child's head at birth, and full of dark grumous pus. Liver tissue fatty and congested (nutmeg liver). A small abscess in left lobe near the upper surface, about the size of a pea. Spleen and kidneys normal.

A considerable number of ulcers are found in the cæcum and ascending colon ; they vary in size from a pea to a florin, are raised and floored for the most part with irregular sloughs. They vary in shape, some being circular and others oval. Some solitary glands in their neighbourhood are observed to be swollen. Peritoneal surface opposite ulcers, dull and thickened. No ulcers or cicatrices in small intestine or other portions of large intestine.

REMARKS.

These two cases occurring, as often happens in hospital experience, at the same time, illustrate some interesting points and raise some useful practical questions in relation to the spontaneous evacuation of hepatic abscesses through the lung, and the proper management of such cases under various contingencies, which may be dealt with under the following heads :—

1. *The situation of the abscesses.*—In both cases the cavities occupied the upper and back part of the right lobe adjoining the fissure for the vena cava. This is the usual site in such cases, and offers less resistance upwards than in any other direction. This position also accounts for the difficulty experienced in finding the abscess with an exploring instrument, either from the front or side ; also for the absence of signs such as fulness, fluctuation, circumscribed tenderness, intercostal bulging, or œdema, which exist in liver abscesses which lie closer to the surface.

2. *The preliminary processes.*—These are phrenic and pleuritic to start with—first inflammatory and then destructive. The circumferential adhesions are the protective outer zone of a process whose centre is necrotic. During this stage, the symptoms are thoracic rather than hepatic and pleuritic rather than pulmonary. In both cases an extension of pleurisy in milder form affected that portion of the membrane which had been shut off from the abscess cavity by adhesions, resulting in serous effusion into the pleura—slight in case No. 1, and copious in case No. 2 ; so copious, indeed, in the latter case, as to mask the real and more important disease. This possibility of occurrence of serous effusion into the general cavity is a clinical fact of importance to be held in view. The signs and symptoms indicating the existence of these preliminary processes are pain in the region of the diaphragm, sometimes of a very acute character, extension of liver dulness upwards, painful catching on deep inspiration, dry cough, fixation of right chest and friction over the base of the right lung.

3. *The Secondary Abscess.*—Whenever a liver abscess seeks a distant point of discharge, it is by means of formation of secondary abscess that the object is sought to be accomplished. Such abscesses occur in the epigastrium, hypochondrium, chest wall or loins, and they simulate parietal abscess, and are perhaps opened as such. The peculiar character of the pus reveals their true character, and on exploration with the finger, a more or less contracted aperture is found, admitting entrance into the liver cavity, unless, as may happen, this has been shut off. In evacuation into stomach, duodenum, colon, peritoneum, pleura or pericardium, such secondary abscesses are not formed. In cases of evacuation through the lung, cavities are excavated in that organ, either by irruption as in case No. 1, or erosion as in case No. 2. The lower lobe is the usual seat of the destructive process which

opens the bronchioles and gives exit to the discharge. In case No. 2 the middle lobe was the portion implicated. The abscess had climbed up along the right side of the pericardium, and the eroded lobe formed its outer wall. Indications of gangrenous destruction of the lung substance were evident in both cases, and what remained of the lobe in both was compressed and consolidated. Why it is that in some instances complete and rapid evacuation is accomplished, and in others the process is delayed or fails to be completed until death by exhaustion occurs, it is not easy to conjecture. The first case is an illustration of apparently complete evacuation in a short time, and then, after a period of apparent convalescence, recurrence of the symptoms. This is not an uncommon history, and the period of intermission may be a prolonged one. Sometimes it looks as if a second abscess of the liver had formed, and was seeking exit by the old route; but probably in most cases the event is due to fresh accumulation in the old cavity. In either event the original symptoms of fever, pain and weight in the side, &c., are reproduced.

4. *Irruption into the pleural cavity.*—In some instances this event is primary, in others secondary. In case No. 2 it was undoubtedly the latter—must have occurred between the period of aspiration and death. Perhaps the removal of the pleuritic effusion, by altering the balance of pressure, caused or conduced to the rupture of the membrane separating the pleural from the abscess cavity. There was no indication of the accident, and in case No. 1, there were indications which appeared to be very positive and convincing; but they were due to acute distension of the lung cavity with pus and air, owing probably to failing expulsive power. Whether the filling of the pleural cavity with the products of hepatic and pulmonary destructive suppuration be primary or secondary, there can be no hesitation regarding the immediate necessity of making a free opening in the parietes (including resection of a rib or ribs) and establishing free and direct drainage. I have seen recovery take place in very desperate cases of this nature.

5. *The reparative process in the liver.*—In case No. 1, this was advanced: the communication between lung and liver had been obliterated; the abscess cavity had been encysted; its wall thickened; its contents degenerated and converted into a fatty emulsion which would in time have become caseated and then cretified. The pathological struggle had been transferred to the chest. In case No. 2, indications of reparative change also existed; the abscess wall was thick and globular, shutting out the cavity from the liver substance, which was no longer being broken up: the walls were lined with lymph, and progressive organisation and contraction of the cicatricial material would, no doubt, had the man lived, accomplished the shrinking, and more or less complete obliteration of the liver abscess. There also the burden of morbid activity had been translated to the cavity of the right chest.

6. *The diagnosis.*—The history in both cases was obscure. In No. 1 the abscess of the liver must have been in existence—latent or concealed—until the events of October 1897 disclosed its existence. The diagnosis of rupture into the pleural cavity was wrong, but the physical signs and general symptoms pointed to that accident. The treatment adopted was, however, correct. In No. 2 it is more than doubtful that the man ever suffered from enteric fever. The conditions found after death must have taken a considerable time for their development, and the pyrexia, combined with the cæcal lesions, must have closely simulated enteric. The acute pleurisy further masked the abscess, until shortly before death, when the true nature of the case was recognised. An exploratory puncture through the chest wall would then, if permitted, have fully confirmed suspicions and led to the only practice which offered any hope or possibility of cure. The existence of an incipient abscess in the left lobe of the liver might, and probably would, have thwarted recovery even if removal of the morbid material had been procured by a free drainage opening.

7. *Cæcal dysentery.*—Case No. 2 was a typical example of a dysenteric process, affecting mainly the solitary glands, confined exclusively to the cæcum. In these cases, the classical symptoms of dysentery—tormina, tenesmus, colic, thickening, angina and frequent scanty discharges of blood and mucus are apt to be suppressed, and those of enteric fever simulated.

The lesions in the cæcum were of long standing and may have preceded the hepatic lesion.

8. *The lesson to be learned.*—The question suggested by these cases is—whether exploration of liver abscesses seeking vent through the lungs should not be made above, rather than below the diaphragm. I have seen so many failures to hit the liver abscess by exploration from below through the substance of the liver, that I am inclined to think that a cautious search along the convexity of the diaphragm would be a safer and more successful proceeding. The general cavity of the pleura is in this situation shut off by adhesions, and the route of approach indicated would also be the best route for drainage in the event of the cavity being broached. The exploration might be made by the aspirator needle introduced through the 7th interspace and pushed directly inwards, or by incision through the same interspace and subsequent use of the finger or director or a straight catheter.

APPENDIX NO. IV.

REPORT ON THE SIXTH INTERNATIONAL CONFERENCE OF RED CROSS SOCIETIES.

By Surgeon-Major W. G. Macpherson, M.A., M.B., Army Medical Staff.

I. *Introductory Remarks.*

The Sixth International Conference* of Red Cross Societies took place in Vienna between the 18th and 24th September, 1897, and was attended by 186 delegates some of whom were appointed by the governments of States, signatory to the Geneva Convention, while others were representative of the various Red Cross National Aid Societies, now established in practically all civilised countries.

In fact, Great Britain, (with the exception of Turkey and Bulgaria), was conspicuous in being the only European country not represented by a delegate of a national aid society.

The following table shows the countries represented and the number of delegates from each:—

Table showing the number of delegates attending the Sixth International Conference of Red Cross Societies.

Countries.	Official delegates.	Delegates of Red Cross Societies.	Representatives of Orders, etc.	Total.
Austria	6	85	4	95
Belgium	1	2	—	3
Bulgaria	2	—	—	2
Congo Free State	1	—	—	1
Denmark	1	1	—	2
France	3	2	—	5
Germany:—	—	6	1	7
Baden	1	2	1	4
Bavaria	1	1	—	2
Hesse	1	—	—	1
Prussia	2	3	—	5
Saxony	—	1	—	1
Würtemburg	—	1	—	1
Greece	—	1	—	1
Great Britain	1	—	1	2
Italy	2	3	—	5
Holland	2	2	—	4
Hungary	3	6	—	9
Japan	1	2	—	3
Norway	—	1	—	1
Sweden	—	1	—	1
Norway and Sweden ..	1	—	—	1
Portugal	1	2	—	3
Roumania	2	1	—	3
Russia	1	1	—	2
Servia	1	2	—	3
Siam	1	—	—	1
Spain	—	3	—	3
Switzerland	2	2	5	9
Turkey	1	—	—	1
United States of America..	3	2	—	5
Total	41	133	12	186

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* Previous International Conferences of Red Cross Societies took place as follows:—At Paris in 1867; Berlin, 1869; Geneva, 1884; Karlsruhe, 1887; and

The President of the Conference, Count Franz Falkenhayn, held an informal reception of delegates on the evening of the 18th September, in the Kursaal of the Stadtpark, and the Conference was formally opened by the Archduke Ludwig Victor the following day in the Festsaal of the University. In addressing the meeting, the Archduke remarked that, no matter how earnestly the Great Powers might strive to preserve universal peace, recent events proved how important, indeed how indispensable, it was to organise voluntary aid societies in time of peace, and that the duty of the Sixth International Conference would be to advance such organisations, with a view to maintaining the Red Cross Associations on a firm basis and developing them in harmony with the diverse needs and requirements of nations.

Sittings for the discussion of the subjects entered on the official programme took place on the 20th, 21st, 22nd and 24th September.

At the commencement of the first sitting, M. de Martens, the official delegate of the Russian government drew attention to the irregularity in the representation of the various governments, some being represented by one delegate only, and others by considerably more. He considered that, for the purpose of voting on the various questions submitted to the Conference, there should be only one vote for each country and, in view of the fact that it had been decided in committee that all delegates should vote equally, thus giving a preponderance of votes to those countries represented by several delegates, he declined on behalf of his government to take part in the voting. The delegates from some other countries expressed themselves in similar terms. As being the only official delegate from Great Britain, I was asked to support M. de Martens, but, although I agreed with him in principle, I did not consider myself in a position to raise the question of abstention from voting, but rather to suggest that rules of voting on the principle of equal representation for each country should be adopted at future Conferences.

The Committee subsequently decided to adopt this principle of voting at the next International Conference.

Some of the official delegates appear to have come armed with instructions and powers from their governments to express an official opinion on the various questions, and no doubt M. de Martens attached considerable importance to the "vote" on this account.

In the opinion of many, however, he made too much of the point, as the so-called "voting" that takes place at these Conferences is simply a general expression of a desire that this or that state of affairs should or should not exist.

In addition to attending all the sittings, I took the opportunity of visiting the principal military hospital at Vienna (Garnisons-Lazareth No. I.), the depôt of the Austrian Red Cross Society and the Humane Society, known as the Wiener Freiwillige Rettungs-Gesellschaft.

I also visited Buda Pesth and saw the hospital and depôt of the Hungarian Red Cross Society there.

At present the transactions of Conferences of Red Cross Societies are of interest to our army only in a general way; that is to say, the organisation and equipment of voluntary aid societies lack that special significance which they possess on the continent, where such societies, in practically all the States, are under the direction of a national committee of the Red Cross, known as the "Central Committee," and are elaborately organised and equipped in time of peace in order to form, under definite regulations, an integral part of the regular Army Medical Service in time of war.

In our country, however, there is no such peace organisation in existence. Voluntary aid, such as would be forthcoming in abundance in the event of our being involved in an international war, would come upon the military authorities in the form of a mass of unorganised and untrained elements, probably so unsuited for the actual requirements of the moment that, for a time at any rate, the working and administration of the regular Army Medical Service would be considerably hampered and embarrassed We

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Rome, 1892. At the Karlsruhe Conference it was decided to hold these International Conferences quinquennially, the place and programme being arranged by the International Committee at Geneva.

have, it is true, organised bearer company units of the Volunteer Medical Staff Corps and, recently, an Army Nursing Sisters' Reserve, while outside these there are the St. John Ambulance Association and the National Society for Aid to the Sick and Wounded in War; but these in no way represent what is meant on the continent by the organisation of voluntary aid societies under a National Central Committee of the Red Cross, the object of such being to maintain in times of peace, under the supervision and inspection of the military authorities, medical and surgical equipment, transport, &c., of the kind and pattern approved and required by the regular Army Medical Service; to collect money for this purpose by voluntary subscription; to organise and equip hospitals, &c., in the home territory for the reception of sick and wounded returning from the front; and to undertake many similar duties; thus practically setting free the entire regular medical service for work with the army in the field, and saving the national revenue of a considerable proportion of the expense of the medical services of the army. In States, where there is compulsory military service, each home has a direct interest in the welfare of the sick and wounded amongst the troops, and under such circumstances it is an easy and natural process for voluntary aid societies to spring into existence, and become organised and maintained in a state of activity in time of peace. It is in this peace organisation, then, of voluntary aid, in this precipitation as it were in advance of the sentiments which would be uppermost in every home after the first great battle of an international war, that the military medical organisation of the great armies of other European States differs so essentially from our own in its relationship to voluntary aid societies, and, one may say, to the country generally.

I have endeavoured, therefore, in this report, merely to bring into prominence the vast amount of practical thought that is being devoted by other nations to the organisation of voluntary aid societies in time of peace, the extensive revenue collected and utilized by these societies, and the important and valuable equipment held in readiness to supplement the regular military medical services in time of war.

II. *Programme of subjects discussed at the conference.*

With regard to the work of the Conference itself, the programme consisted of discussions on:—

1. Questions connected with the organisation and preparation of Red Cross Societies for the requirements of future wars.
2. The extension of the benefits of voluntary aid under the Red Cross to sick and wounded in naval battles.
3. The work of Red Cross Societies in time of peace.
4. The contravention of the Geneva Convention and the prevention of the Red Cross badge being used by unauthorised persons.
5. Other international and diplomatic questions connected with the work of Red Cross Societies.
6. Rules of procedure at International Conferences.
7. The employment of the "Augusta Fund."
8. Reports of work done by Red Cross Societies in recent wars or expeditions in tropical climates.

III. *Reports of Central Committees.*

Under the first group, an important report was submitted by the International Committee of Geneva, summarising the reports of various national central committees on a proposition brought before the previous International Conference in Rome, to the effect that Red Cross Associations should consider what the effect of the new arms of precision (small bore, magazine rifles and smokeless powder) would be in future wars and how far the voluntary aid associations were organised and equipped to meet the probable change in the number and nature of the casualties.

Fourteen Central Committees sent replies to the circular issued by the International Committee on the subject, but reports dealing with the question in detail were forwarded only by Germany, Austria, Hungary, Italy, Holland and Portugal. All these reports are suggestive and practical in character, while some contain points of special interest.

(*a*) *Germany.*

The Report of the Central Committee of the German Red Cross Society deals mainly with the necessity of increasing the personnel of both hospital nursing establishment and sick transport columns (*Sanitäts colonnen*), the preparation and equipment of portable hospital huts and the adoption of a supply of dressing material of some fixed and uniform pattern suitable to modern requirements.

It is noted that an increase in the number of trained female nurses can be obtained by contract with and by subsidising those religious associations and establishments (*religiöse Genossenschaften, Diakonissenhäuser*, &c.), which are in a position to hand over a portion of their staff for voluntary sick nursing in time of war; by increasing the number of institutions established during the last twenty years for training women who follow the occupation of nursing sisters in time of peace, such for example as the Red Cross Nurses Association (*Pflegerinnen vom Rothen Kreuz*); also by associating with the Red Cross other nursing institutions and societies, which have come into existence outside the Red Cross organisation, and which in organisation and training are of good repute and otherwise unobjectionable; and lastly by systematic training of women for employment in general hospital work apart from the actual nursing of sick.

The German Association, however, finds it more difficult to obtain and train men whom one could depend upon becoming available as voluntary sick nurses in time of war. Two organisations have been formed for overcoming this difficulty, both helped and permanently subsidised by the Central Committee and local Red Cross Associations, namely:—

1. The Association of Voluntary Sick Nurses in War (*Die Genossenschaft freiwilliger Krankenpfleger im Kriege*), formed of medical students and others of the same class, who are exempt from military service. These have a theoretical and practical traning in hospitals, although they are naturally not employed in constant sick nursing duties in time of peace.

In addition to these, some of the religious orders and establishments for men can be reckoned upon taking part in the work of voluntary sick nursing in time of war as well as a small number who follow the occupation of hospital attendants in peace.

2. The Volunteer Bearer Companies (*Sanitätscolonnen*). This organisation is intended for the transport of sick and wounded, but is trained in sick nursing as well, the two duties being practically inseparable. The majority of the members of these companies are members of other associations or still liable to military service, but a small number of them would be available for work under the Red Cross Association. Their training is mostly theoretical, combined with practical exercises. Their employment, however, in time of peace, is daily becoming more extensive and they are beginning to do practical work in connection with public calamities and large gatherings, and on one or two occasions they have taken part in military manœuvres. It is not found necessary to restrict the membership entirely to those above the age for military service, seeing that their training for employment with the Red Cross "Sanitätscolonnen" need not be delayed till they reach the age of exemption.

The preparation and maintenance of portable hospital huts in time of peace is insisted upon in Germany, not only in order that there may be no delay in establishing them in sufficient numbers by practised hands in places where they are most wanted in war, but also with a view to their employment in peace in connection with serious accidents and other public calamities. Portable huts have come more and more into use during the past few years on account of their suitability in a variety of ways for employment on such occasions. But experience has proved that to be of real value they must be constructed of the very best material, and the German Central Committee draws attention to the excellent material used in the huts made by Christoph und Unmark of Copenhagen, who have also made improvements in the design of hospital huts, notably in the construction of the flooring. In Germany, portable huts have been employed temporarily in many places throughout the country during the last few years. For example, the Red Cross Central Committee was able to hand over twenty-eight huts to the War Minister for use during the cholera epidemic in Hamburg. Huts were also sent to other towns where cholera was raging, and during the Berlin Industrial Exhibition one was ready in case of accidents. Many similar instances of their employment in peace could be enumerated. At Holtenau, for example, the German Red Cross Association established a hospital of five huts on the occasion of the opening of the Kaiser-Wilhelm Canal. Instances of the permanent use of these huts as supplementary hospitals, infectious hospitals, &c., are also given in the German report, and a note is made of the fact that at the great fair of Nijni Novgorod, 125 of these huts were used to supplement hotel accommodation. During the last five years the German Central Committee of the Red Cross have handed over at cost price or lent over seventy moveable hospital huts. The number of beds fully equipped in each hut is twenty, and this proportion is recommended as the most suitable for use in time of war. The remarks of the German Committee upon moveable huts conclude by stating that in peace they are a great boon, in war a necessity; and to meet the latter requirement they must be got ready, used, and understood in time of peace.

The question of supplying a fixed and uniform dressing material was dealt with in a separate discussion in which Professor von Bergmann of Berlin and Dr. Pozzi of Paris took the principal parts, and Dr. Mooy of Holland exhibited some special dressings of his own design.

The discussion was considered too technical for a Conference of Red Cross Societies, but it may be of interest to note that while Professor von Bergmann insisted upon asepsis and sterilisation being the principal objects to be attained, Dr. Pozzi pointed out with equal force that antisepsis and disinfection were of far more importance on field service. In the former case the provision of an unlimited supply of sterilised dressings and portable sterilising apparatus for sterilising dressings in large quantities in the rear of the army, and in the latter case the provision of an unlimited supply of antiseptic agents and antiseptic dressings were regarded as necessary duties to be undertaken by Red Cross Societies. It either case it was generally conceded that the material maintained for field service dressings should be periodically inspected and tested, and sterilised or charged with antiseptics, when found necessary; and that the provision of portable disinfecting apparatus for sterilising dressings by super-heated steam was essential.

An important point touched upon by Dr. Pozzi was the need of removing wounded men as rapidly as possible to a place where antiseptics are available for thoroughly cleansing and disinfecting wounds. Although bullet wounds *per se* are considered originally aseptic, there are numerous ways in which they become infected, when a man falls in battle, and the disinfection then becomes a matter of necessity before the principles of asepsis can be brought into operation at all.

The dressings exhibited by Dr. Mooy consisted of squares of lint with a small tag in the centre of each square, on one side only, by which the dressing could be held and applied without touching the surface placed directly over the wound. Larger sized dressings had double tags and they are impregnated with antiseptics by dusting a powder or pouring a solution over the surface before applying the dressing. The principle of having dressings for field service ready cut and capable of application without unnecessarily touching or soiling either the dressing itself or the rest of the material in the package cannot be too strongly recommended; and Dr. Mooy's dressings are only one out of many attempts to carry out this principle.

(*b*) *Italy.*

The Italian Central Committee's report recognises that in future wars voluntary aid societies will not have to confine their efforts to the organisation and management of hospitals at home for the reception of the sick and wounded or to providing hospital trains for the evacuation of field hospitals to hospitals in the rear, but that they may be called upon to exercise the functions of field hospitals in the first and second lines of assistance, since the necessity of affording prompt aid to the wounded on the battlefield, and of bringing them under hospital treatment on the spot is likely to be very greatly increased. The Italian Red Cross Committee is consequently bestowing special attention to the subject of increasing the number and personnel of its moveable field hospitals, and during the last five years (1892 to 1897) a notable increase has taken place in its organisation and equipment in this direction. On the 1st January, 1892, the Italian Association possessed the equipment and organisation for 8 field hospitals of 100 beds each, with the equipment, &c., ready packed for transport; 13 field hospitals of 50 beds each, for wheeled transport; and 10 of 50 beds each packed in boxes or saddle bags suitable for mule transport. In addition to these they had the equipment, &c., for 14 hospital trains of 200 beds each, for 1 hospital train of 100 beds, for 2 hospital ships of 125 beds for naval service, and for 33 "aid stations" (*postes de secours*) to be established near the railway stations on the lines of evacuation of wounded from the front. On the 1st January, 1897, this equipment had been increased by the addition of 16 moveable hospitals suitable for mule transport, 13 field hospitals for mountainous country (*Ambulances de montagne*) and 2 floating hospitals for conveying sick and wounded by rivers (*Ambulances fluviales*).

The idea of having "Ambulances de montagne" originated in the demand for small and readily moveable hospitals in Erythrea during the war with Abyssinia, and a trial was made of 50 bed hospitals divisible into 2 sections of 25 beds each. Ten such hospitals were accordingly formed and sent out to Erythrea. They have since been returned to the Red Cross Society's stores and are again ready for use. The personnel of each was one surgeon and two hospital attendants. The equipment of each hospital was packed in 17 boxes, containing everything needed for the treatment of wounded in the front. The packages were light and capable of being carried by 7 mules, with loads not exceeding 60 kilogrammes, excluding the packsaddle, and indeed were arranged so as to be readily carried by bearers. The material in each ambulance was calculated for dressing 150 serious wounds in the first instance. The dimensions of the boxes, bags, field kitchen equipment, &c., did not exceed 64 centimetres in length by 39 in depth and 23 in width (approximately 19″ × 11″ × 7″). A large tent is included in the equipment so that each "ambulance" can be converted into a small hospital for the reception of men seriously wounded, the stretchers being utilised as beds.

The following administrative and executive officers are at present ready for service with the Italian Red Cross Society:—

570 *Medical Officers* (an increase of 287 since 1892) consisting of inspectors (Médecins inspecteurs) ranking as lieutenant-colonel or major. Senior Surgeons (Médecins en chef) ranking as captain, and surgeons ranking as lieutenant or 2nd lieutenant.

103 *Apothecaries* (an increase of 60 since 1892) consisting of senior apothecaries, ranking as captain, and apothecaries ranking as lieutenant or 2nd lieutenant.

248 *Administrative Officers* (an increase of 66) consisting of inspectors (Inspecteurs d'administration) ranking as major, commissaries and accountants ranking as captain, lieutenant, or 2nd lieutenant.

78 *Chaplains, &c.* (as compared with none in 1892), consisting of inspecting chaplains, chaplains, and evangelists, who are given no corresponding military rank.

1,534 *Subordinate Officials* (as compared with 775 in 1892), including senior superintendents (Surveillants en chef) ranking as quartermaster-sergeants, superintendents as corporals, and hospital assistants, as privates.

71 *Cooks*, as privates (an increase of 56), and 567 orderlies, buglers and servants (an increase of 436).

In all, the Italian Red Cross Society possesses a personnel, organised on military lines for supplementing the regular Army Medical Service in time of war, of 999 officers and 2,172 subordinates; being an increase during the last four years of 491 officers, and 1,251 subordinates.

The revenue of the society has increased in proportion. On 31st December, 1891, it possessed in cash 3,561,466 lire, and in material 1,631,030 lire; a total of 5,192,496 lire. At the end of 1896, the cash account showed a balance of 3,841, 531 lire, the material was valued at 2,078,331 lire, and the total assets at 5,919,862 lire, or an increase of 727,366 lire during the past five years.

To further perfect the system, the Italian Red Cross Committee urge two points :—

(1) The training of the personnel in habits of strict military discipline.
(2) Legal recognition of the position of the society as an integral part of the regular military medical service in time of war.

With regard to the first point, the Committee state that, according to the experience they have had in manœuvres in time of peace and in Erythrea, a strict military discipline is essential on the mobilisation of their units; although at first sight this idea may seem opposed to the sentiment of voluntary aid and charity.

With regard to the second point, the Committee have approached the Government on the subject, with the result that a royal commission was appointed in May, 1896, to examine the Red Cross Society's demands and report to the Minister of War.

The following questions were examined by this Commission :—

(*a*) The necessity of determining once and for all, what officers and soldiers on the retired list can be permitted to serve under the Red Cross Association, and whether this permission can only be granted as at present to retired members of the army, inscribed in the territorial militia, and members of the navy inscribed in the naval reserve.
(*b*) The advisability of submitting the Red Cross personnel to military jurisdiction and discipline, both in time of war and during peace manœuvres.
(*c*) The necessity of granting a state pension to members of the Red Cross personnel and their families, in case of wounds, sickness or death, occurring on active service or the direct result of service during peace manœuvres.
(*d*) The necessity of effectually protecting the association from abuse of the badge or distinctive marks of the Red Cross Association.
(*e*) The need of determining whether, on the outbreak of war, all societies, which are only then formed for aiding sick and wounded, should not be placed under the Red Cross Association, seeing that the latter is already formed and organised for that purpose in time of peace.

The last point is one upon which the Italian Red Cross Committee place great stress and apparently with good reason. They note that when war breaks out, at the very time when their association is obliged to appeal to public charity in order to enable them to effectually mobilise their field hospitals and establish their reserve hospitals in the places already fixed for them, they are liable to find themselves competing with other individuals and institutions, all eager to succour the wounded and appealing to public charity to aid them in doing so. Such appeals not only direct the flow of charity into the hands of improvised and imperfectly organised institutions, but deprive the Red Cross Association of the necessary funds to enable them to set in motion the costly machinery which they have elaborated by persistent efforts during long years of peace. The Italian Red Cross Society thus clearly recognises those very conditions that would arise in this country on the outbreak of hostilities, namely, a rush of improvised and disorganised charity offered by individuals and institutions from all parts of the country. The result would be in Italy to impair the usefulness of a well equipped and organised voluntary aid society; in our country, as already stated, to embarrass the administration of the army medical department.

(c) *Austria.*

The Red Cross Association in Austria, as is shown later on, is probably more an integral part of the regular military medical service than in other continental states, and the *report of the Austrian Committee* is consequently more of the nature of an official document than is the case with the reports of other countries.

It recognises that in future wars the absolute number of wounded will be greater on account of the increase in the numbers likely to be engaged in military operations, and, secondly, that not infrequently the number of wounded in any one battle is likely to be quite abnormal in consequence of the new arms of precision. Twenty per cent. is taken as the approximate number of casualties in future battles amongst civilised powers, and it is also supposed that, as compared with past experiences, there will be an increase in the number of severely wounded and of those killed outright.

Touching the question of voluntary aid in the first line, the Austrian Committee declares emphatically that such cannot possibly be contemplated except in the form of bearer companies properly equipped and organised as military units and under military command. It is absolutely out of the question to allow isolated Samaritans and other self-sacrificing individuals to co-operate with the army medical staff on the battlefield. On the other hand, it is pointed out that there is a very large field for voluntary aid in providing dressing material and medical comforts, &c., for the requirements of the medical staff in the fighting line; and the Red Cross Association is recommended to undertake the following duties:—

(1) To keep in readiness absorbent wool and similar dressing material. This must be kept sterilised but not impregnated with any antiseptic agent, because the latter is apt to become inert by keeping and by a peculiar chemical or other combination with the fibres of the material. The old custom, therefore, of keeping antiseptic dressings is discouraged. It is costly, whereas sterilisation is simple and cheap, and can be effected at any time. Should antiseptic dressings be required, the agent can be applied at the time of use.

An apparatus for sterilising instruments and dressings should also be kept for use with bearer companies, and the dressings themselves protected from dust in tin cases, or, if they happen to be impregnated with corrosive sublimate, in carefully made wooden boxes. The various forms of bandages and splints, elastic tourniquets, &c., should also be kept ready by the Red Cross Society, and in large quantities. They should be of the same quality and pattern as the regulation supplies of field hospitals and bearer companies, and in packages suitable for immediate conveyance to the battlefield, it being of importance that the material so supplied by voluntary aid should be of a kind which the officers and men of the Army Medical Corps are accustomed to use themselves.

(2) Another important duty on the battlefield is the work of bringing nourishment to the wounded and those exhausted by fatigue. The medical comforts carried by the regular medical service must soon be exhausted after or during any extensive engagement and cannot well be replenished from places in the neighbourhood of or on the battlefield; while the commissariat wagons carry provisions for healthy troops only, and not articles suitable for wounded and exhausted soldiers.

Very valuable work could therefore be undertaken by the Red Cross Association in this direction. It would not be necessary to keep medical comforts ready stored in time of peace, but the Association could arrange where they could be secured when necessity arose, and form a depôt from which they could be distributed to the army in the field. Such comforts should consist of wine, cognac, rum, tea, coffee, condensed milk, &c.

(3) To co-operate with the Army Medical Service in the evacuation of the wounded to the rear, by means of transport columns organised on a military basis, with stretchers, ambulance wagons, litters, &c. In arranging such columns, a distinction should be made between mountain and field equipment, and the Red Cross Societies are asked to direct their attention to the provision of such equipment. In all cases, however, their transport material should conform with army patterns.

(4) To provide means of lighting the battlefield in order to search for and succour wounded. This would be a welcome addition to the regular army medical equipment. Up till now lanterns and torches have been used, but the Red Cross Society is recommended to study the improvements in electric lighting apparatus, and be prepared to adopt any that may appear useful for field service.

(5) It is assumed that a certain number of wounded cannot with safety be moved from the place where they fall, and in order to provide shelter for

such cases the Austrian Red Cross Association is asked to keep in readiness portable huts and tents, such as have frequently been used in Austria lately in times of public calamities. It is noted that most of the Red Cross Societies already possess fully equipped portable huts, and the first part of the equipment to keep ready for sending to the front should be pillows, blankets and straw mattresses.

(6) Finally the provision of clean linen, &c., is a duty that might well be undertaken by the lady members of the Red Cross Association. The soldier has little opportunity on service of changing his underclothing; and, when he is wounded, the chances are that it becomes soaked with blood and in a condition totally opposed to modern ideas of successful treatment of wounds. The maintenance of a stock of clean underclothing comes next in importance to the provision of dressing materials and the Red Cross Society should consider these two things the most important to have ready for forwarding to the front.

In rear of the army, the Austrian report recommends that aid societies should develop their usefulness in the direction of providing moveable hospitals, hospital trains, &c., but these must be organized on a military basis and capable of being readily adopted as a branch of the regular service.

In the home territory the work of the Red Cross should be in the direction of equipping hospitals and convalescent depôts and arranging for the nursing of wounded in private houses. Small hospitals of 50 to 100 beds are recommended as best from a sanitary point of view, but from an administrative point of view the larger hospitals are cheaper.

(*d*) *Hungary.*

The Hungarian Red Cross Society's report states that the work of a Red Cross Society in future wars calls for the following considerations :—

(1) The means of increasing the number of those engaged in succouring wounded on the battlefield.

(2) The means of increasing the amount of wheeled transport.

(3) The advisability of remunerating persons engaged in the work of affording voluntary aid to wounded in war.

With regard to the first point the Committee believe that the Hungarian War Office is disposed to favour an increase in the number of stretcher bearers, if they can be recruited from the "Volksturm."

The Red Cross Association can aid in this matter :—

(*a*) By undertaking the training of the personnel.
(*b*) By giving them an organisation which will enable them to find employment in peace as rescue parties (*Hilfscolonnen*) in accidents and epidemics.
(*c*) By organising on a military basis out of this body of men a sanitary police for the larger cities.

With regard to increasing the wheeled transport the military authorities deprecate an increase in the number of the heavier wheeled carriages, and the Red Cross Association should limit itself to providing light vehicles capable of being taken anywhere, but fully equipped to undertake independently the transport of wounded.

The Hungarian Red Cross Society has already endeavoured to meet the want of light wheeled transport by an ingenious contrivance by which the four and six-wheeled country carts, drawn by two and three horses respectively, can be converted, by the removal of one or two linch pins, the former into two and the latter into three carts of two wheels each. Each of these light carts is arranged to carry two wounded men, lying down, along with two attendants and a driver. They are intended for use on the battlefield in place of stretchers; and it is pointed out that a stretcher, carrying one man, requires four bearers, whereas with this light cart, only two and a driver are needed for the conveyance of two severely wounded men to the rear.

The remuneration of volunteer stretcher bearers in action is recommended to be carried out according to a system of life insurance suggested by Dr. de Farkas.

Dr. de Farkas' scheme is a novel one and depends upon a combination of life insurance, remuneration to men affording first aid to the wounded and a system of identification papers.

With regard to the identification of combatants, upon which the other two points hinge, he quotes the startling fact that in the Austro-Prussian War of 1867, the fate of 84 officers and 12,287 soldiers could not be traced, notwithstanding every possible attempt made by their families and by the War Office officials. The question of identification was discussed at the Red Cross International Conference of 1884. Identification tallies, it was pointed out then, were unsatisfactory; the soldiers looked upon them as symbols of death and threw them away. As an example of this, it is noted that, although each soldier of the German Army was provided with an identification tally during the Franco-Prussian War, over 1,500 of the killed and wounded could not be identified. Tattooing was also condemned, and marking the clothing with a definite number was equally unsatisfactory, as the clothing got mixed during a campaign and many soldiers, killed on the battlefield, were found with five or six different numbers on different articles in their possession, so that it was impossible to say which was the identification number. Since 1881 the question has remained in abeyance, and Dr. de Farkas' scheme is to make life insurance papers the means of identifying killed and wounded, as also of assessing rewards to those engaged in saving life on the battlefield.

His scheme, as I understand it, is briefly this. A military lottery or life insurance institution will be founded in time of peace. On the mobilisation of the army, each soldier will have given him a share certificate numbered and made out in his own name, which it will be his interest to keep for himself or his family. At the end of the war, the life insurance funds will be divided amongst those wounded, who submit their certificates, or amongst the families of those killed, whose certificates have been found on them. In the case of wounded a percentage of the share will be deducted and given to those responsible for having brought the man from the place where he fell to the dressing station. Dr. de Farkas is convinced that a scheme such as he suggests will have the effect of increasing the efficiency of first aid to the wounded and render the identification of the dead more certain. He does not enter into the financial aspects of the scheme but thinks there should be no difficulty in that respect. He suggests that the Red Cross Society would be a suitable agency for controlling the funds, investing the capital in good securities in time of peace, registering certificates of killed and wounded in battle, and so on.

In connection with this scheme, Dr. de Farkas insists on the necessity of testing during peace the resources of both the regular and voluntary medical services of the army, especially with regard to their ability to rapidly remove wounded to the dressing station. This, he says, can only be done by peace manœuvres, and as a basis for testing the services he estimates that for every 10,000 combatants in any one battle there will be 1,000 casualties, consisting of 250 killed and 750 wounded, of whom 370 will have to be removed in a lying down position. This latter number then should be made to act as severely wounded in manœuvres where 10,000 troops are engaged, and the personnel of the Medical Staff Corps tested not only as to whether the number present is sufficient to cope with the work, but also as to whether the men possess the strength and endurance for labour of so tiring a nature.

(e) *Holland.*

The Dutch Central Committee, in a short statement, analyses the position and work of a Red Cross Society and its Central Committee. The necessity of maintaining an adequate supply of dressing material and means of sick transport and of instructing the personnel and training them in habits of discipline is insisted upon; while the organisation of a Red Cross Society's resources in peace must be based upon the needs of its own country, whether its army is intended for defensive warfare (such as would be the case almost invariably in the lesser States) or for offensive warfare in a hostile or foreign country.

In either case the organisation of a Red Cross Society should only be undertaken when full information is granted on the following points:—

(1) The strength and organisation of its army on a war footing.
(2) The strength and organisation of the regular medical service with each army corps in the field.
(3) The approximate number of constantly sick with an army corps in the field.
(4) The probable percentage of wounded in future battles.
(5) The amount of personnel and material sufficient to remove to hospital within 24 hours of a battle all the wounded of an army corps.

(*f*) *Portugal.*

The report of the Red Cross Central Committee of Portugal is written by Dr. Rodriguez Braga, Chief of the Red Cross Ambulance, during the Portuguese campaign at Lorenzo Marques in 1895. This ambulance undertook the whole work of the Army Medical Department during the campaign, in which about 3,000 European soldiers were engaged. Dr. Braga summarises his experience of the effects of small calibre rifles, as follows :—

(1) For the same number of shots fired, distance being equal, the number of wounded will be greater than formerly.
(2) Wounds of the head and neck will be in greatest proportion and usually fatal, especially as explosive effects on the skull, head, liver, &c., are produced at certain distances and in certain cases.
(3) Wounds will generally be more serious in their immediate effects in consequence of the greater risk of hæmorrhage, the result of division of blood vessels, injuries to bone and lodging of sharp fragments of projectiles.
(4) Wounds of the soft tissues will be simpler and less serious than formerly.
(5) Fractures and wounds of bone will continue to be serious.
(6) Although the probabilities of being able to practise conservative surgery will not be increased, still they will not be diminished.
(7) Unquestionably these wounds which require immediate, energetic, and skilful treatment to prevent a rapidly fatal result will be increased, and this point necessitates careful selection of personnel and material for the first line of assistance.
(8) The number of cases, which it will be dangerous to move after rendering first aid, will also be unquestionably increased.

IV. *The Red Cross in Naval Warfare.*

The second group of subjects discussed at the Conference included the application of the articles of the Geneva Convention to naval warfare and the *rôle* of the Red Cross Association in succouring shipwrecked and wounded seamen, and formed the subject of papers submitted by the Italian Central Committee of the Red Cross, and by Dr. Auffret, Director-General of the Medical Department of the French navy. The Marquis de Vogüe, representing the French Government, Professor Mazzoni of Rome, the Marquis de Villabos (Spain), M. Claparède (Switzerland), and Dr. Löw (Vienna), also spoke on the subject.

This question has constantly been before Red Cross Conferences ever since the first International Conference in 1867 at Geneva. In 1868 articles intended to embrace naval warfare were discussed at Geneva during the Conference on the Convention, but were dropped in consequence of certain objections raised by one of the Powers.

Since then the question has not assumed any concrete form, and so far as the Sixth International Conference is concerned, merely the usual wish was expressed that the various governments should again consider the matter, the Marquis de Vogüe pointing out that diplomatic action, on the initiative of the Powers themselves, alone could bring the wishes of the Conference into effect. But as a basis for an international agreement on the subject, the Italian Red Cross Association submitted a series of articles, defining the nature and limits of the work of Red Cross Associations in naval wars. These articles are 30 in number. The chief suggestions are that all vessels intended for the purpose of rendering aid to sick and wounded at sea shall be called "Red Cross Ships" (*Navires Croix Rouge*), they shall be painted white, no matter what their nationality, with a red cross painted on the bows and stern of the vessel. They shall be fully equipped with the latest improvements in boats, electric light, supply of medical and surgical requirements, &c., and have a high rate of speed, and be able to go to sea at all seasons. The name and description of each "Red Cross Ship" will be communicated to the other States by the State to whom it belongs. The ships will be manned by a crew under command of a captain appointed by the Minister of Marine, and the hospital services will be under a delegate of the Red Cross Association, the former having complete control over the movements and destination of the ship, and the latter over the medical and surgical details. In naval battles near the coast, smaller boats, steam yachts, &c., may be permitted to succour wounded under the Red Cross flag (yellow with a red cross). They need not be painted white, but will still be called "Red Cross Ships" although their neutrality will only be observed in battles within 12,000 metres from the coast. The personnel should have an identical uniform for all nations and wear the international *brassard* of neutrality. The medical personnel of hospital ships belonging to the regular naval or military services as distinct from those belonging to Red Cross Voluntary Aid Associations will also be considered neutral. Red Cross ships will not be permitted to save ships themselves, but only their crew, and must not attempt salvage of wrecked material, or carry letters or orders or help the movements of ships going to action, even if the enemy is not in sight. They will not hoist their national ensign in the presence of opposing fleets or ships. They will be permitted to enter the zone of fire only when they are signalled for to aid a ship in danger of sinking or on fire, and the power to signal for help is left exclusively to the Commander of the ship in distress. All shipwrecked or wounded persons taken on board will be landed at the nearest place, provided it belongs to a Power signatory to the Convention, or in a port, which, in the opinion of the captain is most suitable for disembarkation, and all such persons will engage upon their honour to take no further part in the war. These are the main provisions of the articles drafted by the Italian Red Cross Committee.

Dr. Löw stated that the Austrian Red Cross Association has for some years past maintained and equipped a hospital ship for succouring sick and wounded at sea independently of any International Convention. The project was formed by one of the local branches of the Austrian Red Cross Society, namely the "Frauenhilfsverein" (Ladies' Association) of Istria at Trieste, and the hospital ship was instituted for the sea transport of sick and wounded belonging to the Austro-Hungarian Army and Navy from port to port, or from a fleet at sea to land. The Austro-Hungarian Lloyd Steamship Company and the Government co-operate with the Red Cross Association in instituting and maintaining the ship. The Company place gratuitously at the disposal of the Association a moderately sized vessel capable of being fitted with 100 hospital beds, keeps it ready for sea, and maintains and pays the ship's crew, including engineers, cooks, &c. The Association purchases and maintains the necessary medical and surgical equipment, while the State supplies the medical *personnel*, namely, two naval surgeons, two non-commissioned officers as wardmasters, twelve hospital orderlies, and a non-commissioned officer as accountant, with a retired naval officer as representative of the Admiralty (Naval branch of the Ministry of War) and also as delegate of the Red Cross Association. The Inspector-General of voluntary aid services (a War Office official) selects and appoints the latter, who will be generally responsible for the services performed and generally administer discipline, &c., on board. The State also pays the expenses of dieting, &c., the sick and wounded on board as well as all damages to the vessel during its employment in time of war or as a hospital ship. At other times the Austro-Hungarian Lloyd Steamship Company keep it in a state of repair. The ship is exempted from payment of harbour duties in any of the Austro-Hungarian ports, but pays the customary duties at foreign ports. The Red Cross Hospital Ship is, like all other Red Cross Institutions, under the command of the Inspector-General of voluntary aid to sick and wounded, and the procedure on mobilisation or partial mobilisation is as follows :—The Inspector-General at the request of the Minister for War issues an order to the "Frauenhilfsverein" of Istria to prepare and equip the hospital ship for the particular service required, the ship being for mobilisation purposes berthed in Trieste harbour, and the nature of the equipment dependent upon whether the service is evacuation of sick from hospitals on shore at any port, or evacuation of sick from ships at sea. When the ship has been fully equipped the "Frauenhilfsverein" notifies the fact to the military commandant at Trieste, who is the director-general of transports. It will then be taken over by a staff officer of the Navy according to a detailed method laid down in regulations; and a report of its having been taken over is sent to the garrison hospital at Trieste, to the "Frauenhilfsverein," and to the Austro-Hungarian Lloyd S. S. Company. When this has been done the ship is at the disposal of the Military and Naval Authorities at headquarters.

Dr. Auffret, in his interesting and important publication, enters into minute details of the organisation and equipment of hospital ships and takes the Trieste institution as a model upon which similar institutions should be based. As he himself describes it, there should be a "trilogy" in the establishment of such institutions, formed of three distinct bodies, co-operating together, each contributing a definite share. The trilogy is thus formed of:—

(1) One of the great steamship companies (supplying the ship).
(2) The Red Cross Association (supplying the hospital equipment and fittings to convert the ship into a hospital ship).
(3) The State, Ministry of War or Marine, (supplying the personnel).

Dr. Auffret further draws attention to the valuable aid that might be obtained in time of war from the societies for saving life at sea, which are established on the coast line of nearly all European countries. In France for example there are 80 lifeboat stations and 421 rocket apparatus stations, 20 of them provided with boats. Forty-seven lighthouses have also rocket apparatus, and many other appliances for saving life at sea are established all over the coast line. The various posts are in telegraphic communication with one another, and Dr. Auffret recognises the valuable assistance that could be rendered by affiliating these to a Red Cross Association for aiding sick and wounded in time of naval war.

V. *The Red Cross in Time of Peace.*

The work of Red Cross Societies in time of peace was the subject of a paper read by Dr. Pannwitz of Berlin and led to a discussion, in which M. de Martens (Russia), Dr. Löw (Vienna) and many others took part. Dr. Pannwitz's paper drew special attention to the work that could be done in establishing Red Cross Hospitals for the poorer classes, especially with a view to combating the increase in tubercular diseases and providing constant employment in sick nursing, &c., for those who would be engaged in such duties in time of war. The Central Committee of the German Red Cross Association has, with this object in view, already started a hospital at Grabowsee, near Berlin, by lending 25 of their portable hospital huts, and other branches of the Association are engaged in establishing similar institutions or in providing for the care of families of sick and indigent poor.

M. de Martens laid down certain principles for organising the peace work of Red Cross Associations:—

(*a*) By maintaining a permanent organisation for affording aid in public calamities, such as fires, famines, earthquakes, &c.;
(*b*) By establishing Red Cross Hospitals for affording medical aid to the poorer classes during epidemics and also in ordinary times;
(*c*) By organising humane societies in the larger towns for rendering aid in case of street accidents;
(*d*) By recruiting and instructing male and female sick nurses, the work of untrained Sisters of Mercy having been found in Russia of little value.

M. de Martens pointed out that so far as money considerations were concerned, the Russian Red Cross Society, (in spite of rendering aid in all classes of public calamity, of maintaining more than 2,000 Sisters of Mercy and

85 hospitals, treating something like 1,000,000 sick annually, at an annual cost of 20,000,000 roubles), had increased their capital during the 30 years of their existence, and had at the beginning of 1897 from voluntary subscriptions alone, a balance of 10,000,000 roubles, and fixed property valued at 2,000,000 roubles.

It was pointed out by Dr. Galvani (Greece) that some States are not wealthy enough to collect or expend much money in time of peace; and eventually it was agreed that the various Central Committees should report to the next conference what their societies have been able to effect in the matter.

VI. *The Protection of the Red Cross Badge.*

Much importance was attached to the fourth group of subjects, namely the contravention of the Geneva Convention and the protection of the Red Cross badge by law so as to prevent its use by unauthorised persons. M. de Martens introduced both subjects, and with regard to the Geneva Convention urged that each country should insert a clause in its criminal code making the contravention of the Geneva Convention penal; and, in addition, that an International Court, approved by all the Governments signatory to the Geneva Convention, should be created, to which appeals should be made in doubtful cases. M. de Martens referred especially to a resolution couched in similar terms, brought forward by M. Gustave Moynier and passed at the meeting of the Institute of International law at Cambridge in 1895, and pointed out that the International Committee at Geneva could exercise no authority in the matter as at present constituted.

The Conference passed a resolution to the effect that it is desirable that each State should insert a clause into its criminal code for the punishment of transgressions of the Geneva Convention, and that an International Committee, approved by the Powers signatory to the Geneva Convention and by the Central Committees of the Red Cross, should be established to decide in doubtful cases.

With regard to the abuse of the badge, several States have passed laws on the subject. In Servia, only the Red Cross Society can use it and any transgression of the law can be punished by imprisonment and fine, the latter going to the funds of the Society. In Italy the Italian Red Cross Society has the power to prosecute any person or society using the badge. In Belgium there is also a law protecting it. In Hungary manufacturers of medical and surgical material are only permitted to use it on payment of a tax of 20 to 50 florins yearly, the money going to the pension fund for sick nurses. In Austria a ministerial order of 5th March, 1883, prohibited the use of the badge by any society not recognised by the Austrian Red Cross Association. In Russia the act of constitution of the Red Cross Society includes a clause placing the use of the badge exclusively at the disposal of the Society. Under this clause the Central Committee alone has the right to grant authority to other societies, institutions or individuals to use the badge and then only if it is with some special object in view and in the service of the Red Cross. The new criminal code, moreover, in Russia, has a clause to the effect that the abuse of the badge of the Red Cross, without legal authority, in trade, for the transport of goods, for collecting money, for signboards or other designations of commercial and industrial establishments, renders the delinquent liable to imprisonment for three months or to a fine not exceeding 300 roubles, provided the abuse is not accompanied by fraud of any kind. In Germany no steps have yet been taken to protect the badge, but a resolution brought forward by Baron von Knesebeck (one of the German delegates) was passed by the Conference, thankingthe Russian Central Committee for what they had done in the matter and expressing a hope that, wherever the Red Cross badge had not as yet been granted protection by law, the example of Russia should be followed.

VII. *International Relations of Red Cross Societies.*

The fifth group of subjects discussed at the Conference embraced international and diplomatic questions on the following points:

(1) The principles regulating the manner in which Red Cross Societies of different nationalities should mutually aid one another in time of war.

(2) The principles that should be adopted for securing the passage of a Red Cross ambulance from a neutral state through the enemy's territory when proceeding to the assistance of one of the belligerent armies, and whether the latter would have the right to refuse such assistance, provided all the conditions regulating the part to be taken by its own national Red Cross Society are submitted to.

(3) The steps to be taken to secure free passage along with exemption from any custom house duties or formalities, by railways and steamships of all medical and surgical equipment intended for sick and wounded in war or during public calamities.

The first of these subjects was introduced by Baron von Knesebeck (Germany). The discussion was limited to whether the Central Committee of one nation should offer assistance or apply for assistance from the Central Committee of another nation direct or through the intervention of the International Committee at Geneva; some speakers, including the Russian delegate, desiring the former method, and others, including the Austrian and German delegates and the delegates of the lesser States, the latter. Eventually it was agreed that Central Committees should be free to ask and apply for aid as they pleased, *i.e.*, either direct or through the International Committee of Geneva, but applications for aid would only be recognised, when they came from societies recognised as belonging to a Red Cross Association.

The other two subjects in this group were introduced by M. de Martens (Russia).

The question of the right to refuse assistance from the Red Cross Society of a neutral country or to refuse passage to its ambulance, when proceeding to afford aid to the sick and wounded of the enemy, led to considerable discussion, but the Italian, German and Austrian delegates were emphatic in their statement that nations had every right to refuse and tha tthe acceptance or refusal of assistance in time of war was entirely a matter for governments and the generals commanding the belligerent forces to decide.

In connection with the third subject, much interesting information was given regarding the exemption from railway or other charges for the conveyance of the material and personnel of Red Cross Societies. In France such material is carried free, and in Italy a reduced tariff and freedom from custom duties within Italian territory are in operation. In Servia a similar act has been passed as well as one allowing all parcels marked with the Red Cross to go free by post. In Russia a congress of representatives of railways not belonging to the State was held in 1894, at the desire of the Red Cross Central Committee, and it was agreed to give free transport of both personnel and material belonging to the Association. The State railways grant the same privilege. The Russian tariff provides for the free conveyance of the following :—

(1) All the personnel of "Colonnes Sanitaires" composed of representatives and agents of the Red Cross Society, doctors, nursing sisters, and hospital attendants.

(2) All such persons when travelling alone and detached from their "Colonnes Sanitaires."

(3) All Sisters of Mercy travelling on duty for the Red Cross Society.

(4) All sick and wounded soldiers and Sisters of Mercy, with or without escort, (provided the escort does not exceed the number of sick and wounded), proceeding to or returning from places where they are under treatment.

(5) All the Society's material, notably :—

(*a*) Materials for the construction and furnishing of hospitals, portable huts, tents, clothing and bedding for sick, &c.

(*b*) Medical and surgical material, instruments, utensils, &c.

(*c*) Sick transport such as stretchers, wagons, boats, &c., and their equipment.

(*d*) Personal baggage of doctors and sick attendants.

The weight carried gratuitously by each train is limited to approximately three tons (200 puds) by passenger train and nine tons (600 puds) by goods train.

At the close of the discussion it was decided that a complete report on the subject should be submitted to the next International Conference by the various Central Committees, showing what privileges had been secured in their countries for free conveyance of personnel and material of voluntary aid societies, acting under the Red Cross.

VIII. *Minor Discussions.*

The sixth and seventh groups of subjects, namely, the rules of precedure at International Conferences and the employment of the "Augusta Fund," do not call for any considerable notice in this report beyond mention of the fact that it was agreed to allow the latter, which was created in memory of the Empress Augusta for the purpose of offering prizes for inventions &c., in connection with hospital and other equipment for succouring sick and wounded in war, to accumulate until the next International Conference instead of devoting it to the purpose of a prize competition at present.

IX. *The Russian Red Cross Society's Mission to Abyssinia.*

In the eighth group of subjects some interesting reports were submitted to the Conference, two of which, namely the work of the Russian Red Cross Society in Abyssinia and the organisation and working of the Congolese and African Red Cross Association (*L'Association Congolaise et Africaine de la Croix-Rouge*) merit detailed notice.

In connection with the former, it may be noted that the Russian Red Cross Society claims to have rendered assistance to the wounded of foreign armies in all wars that have taken place since its foundation. It has sent out ambulance columns to the Franco-Prussian War, the war between Turkey and Montenegro, the war between Bulgaria and Servia and the war between China and Japan. It determined therefore to maintain its traditions by taking part in the war between Italy and Abyssinia in 1896. The ambulances were under the charge of Major-General Schvedof, a member of the Red Cross Central Committee, who was formerly in charge of similar ambulances in the Russo-Turkish War of 1877–78 and in the Servian War of 1885. The personnel was selected chiefly from amongst the officers and subordinates of the regular military medical Service on the grounds that in an expedition to Abyssinia it was necessary to have a personnel accustomed to military discipline and camp life. This personnel consisted of the "plenipotentiary" and chief of the expedition, Major-General Schvedof, and two deputy commissioners, (one to take charge of an ambulance in Erythrea, and the other of an ambulance in Abyssinia proper), a chaplain, a secretary or treasurer, an officer in charge of the depôt, a principal medical officer, an agent of the Society for special missions, 17 medical officers (7 médecins, 4 officiers de santé, 6 aides-chirurgiens), 1 apothecary, 12 nursing sisters (sœurs de charité), 2 interpreters, and 21 sick attendants. The materiel consisted of the usual medical and surgical equipment (dressings, instruments, &c.), tents, bedding, litters, cooking and other utensils, medical comforts, &c. The total weight of the materiel was 34 tons.

The expedition was got ready on the 25th March (6th April new style) and left St. Petersburg the same day for Odessa. From Odessa it was shipped to Alexandria, which was reached on 7th April (19th April). The section intended for Erythrea was to have proceeded to Massowah but the Italian Government asked that the mission should proceed from Naples, and the Red Cross Association fitted out another and special ambulance for Naples, under the direction of Dr. Paslof, Surgeon to the Imperial Court, who had with him several other eminent surgeons. Subsequently, however, the Italian Government informed them that they would not be allowed to enter Abyssinia by Massowah and that their assistance would not be required. Consequently it was decided to enter Abyssinia by Jiboutil, and, as the route was long and difficult, the nursing sisters and five of the hospital orderlies were sent back to Russia. The remainder of the personnel and all the material left Port Said on the 11th April (23rd April) and reached Jiboutil on the 18th (30th April) in the "Nubia." The personnel suffered greatly from the heat of the Red Sea, prickly heat and intestinal complaints being specially prevalent. On arrival at Jiboutil they were despatched inland in three caravans, the first leaving on the 20th April (2nd May) the second on 28th April (10th May) and the third on 11th May (23rd May). The three caravans consisted of 252 camels and 19 donkeys. An escort of 28 Abyssinians, 56 Somali servants and six "sheikhs" accompanied the mission. The arrangements for the march were made in advance by the special agent accompanying the expedition, who accomplished the journey between Jiboutil and Harrar on camels in 3½ days. The ambulance followed but took 18 days to traverse the route, a distance of 350 kilometres. The personnel suffered greatly from fatigue and heat during the march. In some places they note that there was a total absence of water. They reached Harrar on 15th May (27th May) and remained there for one month, during which time a field hospital was kept working. It was partly formed of the houses in which the personnel was lodged, and partly of tents; and was divided into three sections, one for medical, one for surgical, and one for ophthalmic work. The numbers applying for treatment increased daily and all classes of natives were treated not only in the hospital but in the city and neighbouring villages. In all, 1,196 patients were treated during the month in hospital and 28 in their homes. 51 surgical operations were performed and 28 cases of gunshot wounds were admitted. At the end of the month (18th June old style), the major portion of the ambulance started for Addas Abbaba by the Dankali desert (the lower route), leaving 2 surgeons and 2 assistant surgeons with 3 ward orderlies to continue the work in Harrar, where they remained till the 8th (20th) November. The journey from Harrar to Addas Abbaba covered a distance of 640 kilometres and lasted till the 25th July (7th August). The chief difficulties on the way were the excessive heat and absence of water; although during the latter part rain fell continuously for 5 days. At each camping ground medical and surgical aid was given to all classes of sick and wounded, and amongst others, to many Italian prisoners of war. 300 in all were treated on the march, 8 cases of gunshot wounds receiving prolonged treatment, while 7 surgical operations were performed. At Addas Abbaba a hospital was constructed of wooden huts, with considerable difficulty on account of the nature of the soil and difficulty in getting sufficient wood. The soil is noted as being composed of a surface layer of clay, 8 to 12 inches thick, on a stony subsoil, and in rainy weather formed a thick tenacious mud. To make proper surface drains, and drive the supports of the huts into the ground,the rocky subsoil had to be dug into. Two hundred native labourers were employed in the work of constructing the huts. In the meanwhile the hospital was composed of tents surrounded by a zareba of bamboos, leaving an entrance to the enclosure by a small gateway only, barred off so as to admit one patient at a time. This was to prevent confusion and a rush of patients, amongst whom there were constant quarrelling and fighting to get attended to first.

The tents were arranged as at Harrar for distribution of work. Operations were performed in two tents joined together with apertures for light in the top and sides, the floor being carefully cemented over. Another tent was set apart for electric and massage treatment. In all there were 33 fully equipped beds, but in case of necessity these could be augmented.

Sick were treated from the 1st August onwards, and the hospital was in full working order on the 7th. There was heavy rain at the time, but this did not prevent the natives coming for treatment in great numbers, as soon as they heard of the arrival of the mission. The Negus had already shown a desire to join the Geneva Convention, and the opportunity was taken of inducing him to recognise as neutral the Italian Ambulances and Medical Establishments. He eventually caused his standard to be hoisted alongside the Red Cross Flag, and announced that the Empress Taitu had agreed to become patroness of an Abyssinian Red Cross Association.

On the 10th October (22nd) the Mission left Addas Abbaba on its return journey to the coast, but at the special request of the Negus, a detachment was left behind to look after the wounded and complete the treatment of 30 operation cases remaining in hospital. The detachment consisted of *four* doctors and an interpreter, and remained till the 11th (22nd) January.

An epidemic of small-pox was decimating the population at the time, and vaccination was practised amongst the natives.

During the two months in which the major portion of the mission remained at Addas Abbaba, 8,919 sick and wounded were treated, of whom 958 were in the latter category; 70 patients were attended to at their homes, 75 were treated as in-patients in the hospital, and 115 operations were performed. The return journey from Addas Abbaba to Harrar lasted from 10th (22nd) October to 8th (20th) November. At Harrar the main body was rejoined by the detachment left behind there. The medical officers of this detachment had treated 15,785 cases of sickness, and 170 cases of wounds, as out-patients, paid 105 visits to patients at their homes, and performed 496 surgical operations.

The hospital at Harrar was now closed, and the mission resumed its march to the coast on the 16th (28th) November, reaching Jiboutil in 14 days. It embarked on the 7th (19th) December and arrived in St. Petersburg on the 23rd December (4th January) after nine months' absence.

The detachment left at Addas Abbaba remained there till the 11th (23rd) January, treating 4,517 patients, of whom 198 were wounded, and performing 301 surgical operations. The detachment eventually returned to St. Petersburg on the 30th March (11th April). The total results of the expedition are 30,946 patients treated as out-patients (15,559 attending once only, and 15,387 receiving continuous treatment), 762 wounded and 190 sick admitted to hospital, 279 domiciliary visits paid, and 1,143 surgical operations performed. Only two cases died in hospital, one a woman who had been shot in the lungs, and the other a man who died of wounds. One hundred and eighty-eight of the sick and wounded treated were Italians.

The cost of the expedition was 159,000 roubles, in addition to 15,000 roubles' worth of equipment, such as surgical instruments, tents, stretchers, surgical dressings, material and drugs, utensils, &c., given away to the Abyssinians for the formation of an Abyssinian Red Cross Society.

X. *The Red Cross in the Congo Free State.*

The Congolese and African Red Cross Association was founded on the 30th December, 1888, by the King of the Belgians. Its primary object is to render aid to sick and wounded soldiers and subjects of the Congo Free State, both in peace and war; but it offers assistance as well, in all parts of Africa, without any reserve beyond the sanction of existing local authorities, to all sick and wounded Europeans and other individuals engaged in the work of African civilisation, and to sick and wounded natives. For this purpose the Association is at present engaged in establishing hospitals, sanatoria and similar institutions in Central Africa.

So far the Association has not any experience extending over a long period of time; but, since its foundation, its members have received sick or wounded officials and explorers returning from expeditions in the interior and treated them in a sanatorium selected and constructed where the conditions of climate and other circumstances appeared to afford the best prospects of recovery. This sanatorium is at Boma, the capital of the Government of the Congo Free State, and is in full working order. The original intention was to construct the sanatorium at Moanda, near the mouth of the Congo, in order to let patients have the benefit of sea air; but the idea was abandoned on account of the difficulties of transport thither from the interior.

The sanatorium at Boma is constructed on the system of small isolated pavilions, each accommodating two patients in separate wards. The wards are specially made large and airy and have a bath-room attached to each. They are raised from the ground and have wide verandahs.

The first pavilion was made of wood in separate pieces, joined by iron clamps, and was constructed in Belgium and sent to Boma in pieces not exceeding 30 kilos. in weight each, so as to form suitable loads for bearers. Owing, however, to the progress of industries in the Congo, the Association has been able to construct the remaining pavilions of bricks made on the spot. Bricks are now strongly recommended as the best material for building in Central Africa. The brick pavilions are found to be more durable and cooler, the material keeps out noise better than wood and is not attacked by insects. The construction of wooden huts with double walls linen and all the necessary material for rendering assistance in cases of parturition in the street. These latter cases seem quite frequent in Vienna, as many as 30 having been attended during the past year by the officials of the Society. There are also bags containing pneumatophores, with sufficient oxygen to enable a person to continue breathing for half an hour, while engaged in rescue operations wherever there is an irrespirable atmosphere.

The rooms for the reception of the sick are equipped for performing any emergent operation. The floors are of concrete; corrosive sublimate, lysol, and carbolic acid solutions are kept ready and practically "laid on" to wash-hand basins, operating tables, &c. The furniture is all covered with tin and white enamel, and there is an electric heating apparatus.

The station is in telegraphic and telephonic communication with all parts of the town night and day, and in the office of the medical officers on duty there is a blackboard, on which is entered twice daily the number of beds vacant at each of the city hospitals. Thus when any accident occurs a message is sent from the nearest police or fire station, or wherever there is a telephone, stating what has happened and where. An ambulance wagon, which is always in readiness, is at once sent off to the spot with doctor, medical student and two sick attendants, who take with them a pannier, havresac, or other equipment suitable for dealing with the accident reported. The patient is then taken to his home, or to the nearest hospital where there is a vacant bed, according to circumstances.

The equipment for sick transport, &c., is all maintained in the central station, in an admirably constructed annexe, containing stabling for 19 horses, with barracks for drivers and sick attendants above the stables. The stables are kept remarkably clean and healthy, special dung buckets being used which are removed and emptied weekly in a specially constructed cart. There is a large variety of wheeled carriages including landaus, ambulance wagons, broughams, padded wagons for insane cases and tin lined wagons for infectious diseases. The wagon employed for ordinary cases is a two-horse wagon, opening at the side, along its whole length, and containing a stretcher, which can be slung or not as required. There is an electric lamp inside the wagon and another is fixed at the fore end of the shaft, the light being turned on or off by the driver at will. Each wagon carries a reserve wheel, and in winter the wheels can be replaced by sleigh runners.

In connection with the central station there are workshops, where all kinds of repairs can be effected.

In addition to the conveyances for sick transport there are provision wagons for the staff, should the accident be of a nature requiring prolonged work, and large, medium and small sized kitchen wagons for preparing soup and other nourishment for the sufferers.

Stretchers are kept ready not only in the central station but in various parts of the town, in the waiting rooms connected with the tramway lines, in stands by the side of streets, &c. For railway accidents two-tier wooden stretchers are kept ready to be fitted into railway carriages.

There is also a supply of bath chairs in the establishment.

When cases of infectious diseases are removed by the Society from their homes to the hospitals, all the infected material is disinfected at the infectious diseases hospitals or at the city disinfecting establishment, which is a municipal establishment, but for its own use, the Society possesses a portable steam disinfecting apparatus, and, if cases of cholera are being removed, the attendants wear waterproof clothing and gloves.

Many cases of sudden death are attended to, and, for the purpose of removing the bodies to a mortuary, a special wagon, constructed as a hollow cylinder on wheels, forms part of the equipment of the central station.

The permanent medical officers get paid 1,800 to 2,400 gulden yearly by the Society. The sick attendants begin with a monthly salary of 54 gulden and rise to 80 gulden. They are said to be extremely efficient and their pay is comparatively high.

During the short time spent in visiting the central station, I had ample opportunity of observing the numerous calls made upon the Society. On one occasion as many as eighteen calls were attended to in one hour, the wagons being turned out as promptly as the engines of a well organised fire brigade.

Some idea of the amount of useful work done may be gathered from the fact that during the year 1896, a total of 8,093 street accidents were attended to and 5,634 surgical and medical cases were removed in the ambulance wagons of the Society, either to their homes or to hospitals.

The cases comprised all varieties of accidents requiring first aid, such as cases of fainting, epilepsy, drunkenness, apoplexy, poisoning of various kinds, attempted suicides or murders, wounds, and injuries of every description. The cases appear to have been fairly evenly distributed throughout the several months of the year, while it is noted that 5,270 of the street accidents occurred during the day and 2,823 during the night.

At present, with the exception of the stretcher stands in the streets, the Society possess only one station, the central station already described, but a building fund has been established and it is intended to open branch stations whenever sufficient money has been contributed.

XII. *The Red Cross Depôt in Vienna.*

The depôt of the Red Cross Society in Vienna is in the Prater, close to the Rotunda, and consists of seven huts arranged in line parallel to one another. They are constructed of brick, with wooden floors, roof ventilation, and side windows, and are intended to be converted into hospitals in time of war. Each hut has one large room only, capable of containing 200 beds. Five of the huts store in peace time the wheeled transport of the transport columns maintained by the Vienna Red Cross Association for evacuating field hospitals and dressing stations, each column consisting of 15 ambulance wagons and one material wagon. A sixth hut contains the equipment for converting the depôt huts into hospitals and the materials for erecting moveable hospital huts, and the seventh the complete equipment and sick transport of a field hospital for 200 beds, maintained by the Deutscher-Ritter-Orden. The wheeled transport kept in this hut consists of 10 ambulance wagons, holding 4 stretchers each, and one omnibus. There are also kept at the depôt of the Red Cross Association the pieces for constructing 30 portable hospital huts, one hut requiring three carts to convey the several pieces and its hospital equipment. A portable steam disinfecting apparatus (Gebrüder Schmidt, Weimar, pattern) is also kept at the depôt. The equipment for converting the huts into hospitals is very complete and consists of wire-mattress folding beds, bed-head tables, blankets, pillows, linen, stoves for heating, food utensils, and all the usual medical and surgical necessaries. Some idea of the extent of the wheeled transport and hospital equipment maintained by the Austrian Red Cross Association can be formed when it is stated that similar depôts exist in all the principal towns, while the Deutscher-Ritter-Orden alone maintains in the various depôts 44 field sick-transport columns with equipment, consisting of a total of 176 ambulance wagons, 48 omnibuses for the personnel, 1,056 field stretchers, 820 panniers for equipment, 48 field kitchens, 48 operation huts, clothing and equipment for 1,156 soldiers belonging to the bearer and transport columns, as well as saddlery and stable requisites for 48 riding and 984 carriage horses. In addition to this equipment the Order maintains 4 field hospitals for 200 sick each, similar to that stored in the Vienna depôt, equipped with 8 ambulance wagons and 4 material wagons, 32 stretchers, and 364 boxes and panniers of medical and surgical equipment and hospital requisities, in addition to the personal equipment of 120 hospital orderlies and 8 officers' servants. The Order also possesses a hospital in Schloss Freudenthal for 4 wounded officers and 40 men, equipped and maintained at the personal expense of the Archduke Wilhelm, and civil hospitals at Troppau (28 beds), Freudenthal (34 beds), Friesach (30 beds), and Langendorf (6 beds).

Another Order, devoting itself to voluntary aid to sick and wounded, is the Malteser Ritter Orden, which maintains and fully equips hospital railway trains for use in time of war.

XIII. *The Red Cross Hospital and Depôt in Buda Pesth.*

At Buda Pesth, the depôt of the Red Cross Society is in the grounds of the Red Cross Hospital, newly erected on the southern outskirts of Buda, some distance from the Danube and near the new military hospital. The hospital consists of a central administrative block and four separate pavilions for the sick, containing in all 120 beds; there are also a separate kitchen block, engine room, and ice house; a chapel, mortuary and house for the surgical staff. An institute for nursing sisters, 120 of whom are employed in the hospital, is in course of construction. None of the buildings are connected with one another by covered ways. The hospital is used for the reception of paying patients of two classes, two of the pavilions being set apart for first class patients paying 8 florins, and two for second class patients paying 2 florins daily. Each patient in the former class has a separate room, the latter class are treated in small general wards. One of the novelties in the hospital is that each bed has a telephone close to it, connected with all the principal places of entertainment, &c., and a patient can thus relieve the monotony of treatment by listening to opera, concerts, or in fact anything he or she pleases, the system of telephonic communication in Buda Pesth embracing all forms of instruction and entertainment. The Red Cross depôt consists of a series of barrack huts, five in all, containing field medical and surgical equipment, and wheeled transport. These huts are built of brick, and, as in the case of the Red Cross depôt huts at Vienna, are intended for use as reserve hospitals in time of war. They are all of similar pattern, each hut containing two large wards capable of accommodating 40 to 50 sick each. The wards have ridge ventilation with five windows on each side and a large "porte cochère" as entrance at the end. The floors are concreted throughout. In the centre of the hut and between the two large wards there are two small rooms and a kitchen, used in peace time as quarters of the caretakers. The equipment in one of the huts consisted of various field hospital materials, models of methods of carrying wounded in country wagons, and a large omnibus and brougham for the *personnel* of the Red Cross sick transport columns. Amongst the articles of field equipment, I specially noted a portable operation table fitted into a wooden case, the sides of which were formed of panels capable of being readily removed and used as fittings (tables, &c.) for an operating tent or room. The arrangement was ingenious and compact but did not appear to be one that would stand much rough work. The second large room of this hut contained 9 new ambulance wagons and 1 material wagon of the Blessirten Transport Colonne No. XXXI. The wagons are of the new pattern required by the Army Medical Service, and are constructed to carry four stretchers in two tiers, fitted with a rail for fixing and slinging the stretchers and carrying them forward into their places in such a way that none of the bearers need enter the wagon. The material wagon is fitted with a large piece of canvas on the top, so as to enable it to be converted into an operating tent. Another of the huts contained similar wheeled transport for the Transport Columns. Nos. XXIX and XXX. A third hut contained 16 material wagons and 16 ambulance wagons of an older and heavier pattern, along with an omnibus for the medical personnel of the "Elizabeth" field hospital. All the material for the field hospital was kept ready packed in panniers to be placed in the material wagons. Amongst the equipment in the other huts there were two portable disinfecting apparatus of the Geneste and Herscher or "Equifex" pattern. These apparatus seemed heavy and only suitable for being drawn along good roads. There were also 1 large country wagon for carrying wounded lying down, 12 long narrow country wagons, with medical and surgical materials ready packed in panniers; stretchers and apparatus for carrying wounded on the backs of bearers in hilly country, and 20 light country carts arranged for carrying wounded lying down.

XIV. *The Military Hospital in Vienna.*

No. 1 garrison hospital at Vienna was visited under the guidance and sanction of Generalstabsarzt Dr. Kraus, the head of the Austrian Army Medical Service. There are 26 garrison hospitals altogether throughout the Austro-Hungarian Empire, designated by consecutive numbers. Thus, Nos. 1 and 2 garrison hospitals are at Vienna, No. 3 at Przemysl, No. 4 at Linz, and so on, Vienna and Buda Pesth being the only towns where there are two such garrison hospitals. Garrisons with less than 500 men have what are called troop or regimental hospitals (Truppenspitäler), which are named after the place where they are established, and which would be closed on the troops leaving the station. Where there are neither garrison nor regimental hospitals, cases of sickness likely soon to recover are treated in what are called "sick houses" (Maroden-häuser) the severer cases being conveyed by rail or ambulance wagon to the nearest military hospital. These "Maroden-häuser" are established, however, only where the garrisons are between 300 and 500 strong.

No. 1 garrison hospital is an old building covering an extensive area of ground, but placed in a somewhat densely built part of Vienna with but few open spaces around. It was constructed in 1784 as part of the "Josephinum" Academy of Sciences and was originally a military medical school and cadet establishment, now no longer in existence.* The number of beds is 600, capable of increase to 750. An officer's hospital with 49 beds was constructed in 1873 on an adjoining piece of ground. There are two large operating rooms in the hospital, the windows of the old building having been enlarged and the floors concreted. These rooms are fitted with sterilisers and hot water apparatus, and the customary operating room articles of furniture. An annexe has recently been built containing the kitchen and bath rooms. The cooking is by steam, and women cooks are employed. The bath rooms are numerous (50 in all) and of various kinds. They are set apart for use at fixed times by officers and men of the garrison, not patients in hospital. In the same annexe there is a fixed disinfecting apparatus (Thursfield, Vienna, pattern) and also a light and simple pattern of portable disinfecting apparatus by the same maker, consisting of a cylindrical chamber, with fire place and stoke hole beneath it, slung between two wheels. 150 of these portable apparatus are in use in the Austrian Army. A zinc lined box on two wheels is used for carrying infected articles from the barracks to the hospital for disinfection. Sick are conveyed from barracks to hospital in ambulance wagons, 8 wagons of the old pattern, carrying 4 stretchers each, being kept at the hospital for this purpose in a shed. The horses are stabled in the hospital grounds. There are also three ambulance wagons for purposes of instruction in loading and unloading wounded, &c.

The medical establishment consists of 2 surgeon-colonels, 4 surgeon-majors, 4 regimental surgeons (surgeon captains), and 2 surgeon-lieutenants. There are also on the strength of the hospital, 2 subaltern officers (ober-officiere), 1 chaplain, 1 paymaster, and 16 officers' servants, 3 apothecaries and 1 apothecary's assistant, and a Medical Staff Corps detachment of 5 officers and 258 men. In Austria, it should be noted, the Medical Staff Corps (Sanitäts-Truppen) is officered by officers who are especially gazetted to the corps, and who are not medical officers. There are at present no nursing sisters in military employment.

Attached to the hospital there are bacteriological and chemical laboratories and pathological and anatomical museums. The latter contain the famous wax anatomical preparations which Napoleon I. was said to have been desirous of securing, but which were saved by being removed and concealed when the Grand Army passed through Vienna.

There is also a museum where patterns of every form of equipment connected with the medical and sanitary work of the army are kept. Amongst new inventions that are being tried and adopted the following were brought to my notice :—

(1) An apparatus for illuminating dressing stations, &c., on the battlefield at night.

This apparatus consisted of a zinc reservoir or bucket, of 72 litre capacity, capable of standing any amount of rough work. It is filled with petroleum, 64 litres being the quantity put into each reservoir. There is an air force pump connected with the reservoir and the pressure in it is increased up to 0·7 kilo. as shown on an attached manometer. A small quantity of petroleum is previously lighted in a cup below the burner, which is attached to the end of a gas tube, fixed to the top of the reservoir, and, when the stop cock is opened, petroleum gas passes up the tube and forms a brilliant flame in the burner. The flame, which by lengthening or shortening the tube can be placed at a height of 8 to 13 feet above the level of the ground, is 5 inches high and is said to illuminate a surface area of over 5,000 square yards with great brilliancy, and to keep burning even in heavy rain and wind. The illuminating power is equal to 700 candles, and the expenditure of petroleum is 3 kilograms per hour. The apparatus is the invention of Herr Kohl, 20, Nussdorfer Strasse, Vienna, and costs 225 florins in Vienna. It has been adopted by the Austrian Army Medical Service for use in the dressing stations of each infantry division in the field. The weight of the apparatus packed for transport is 56 kilograms, and it forms a package about 4 feet high by 1½ feet wide.

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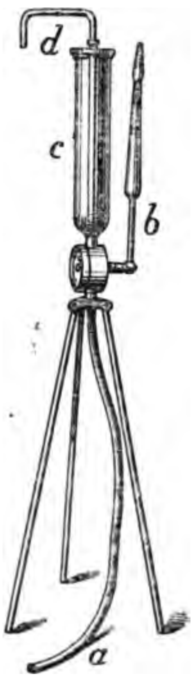
* The medical officers of the Austrian Army are appointed by selection and not by competitive examination from amongst the students of the University. After three years' study (6 semesters) they receive 300 to 500 gulden yearly allowance, and qualify at the end of the fifth year (10 semesters). An additional year is spent in a military hospital and they are then gazetted as regimental surgeons. Twenty-five army medical officers hold appointments for a complete year in civil hospital "cliniques."

For searching for wounded, torches (long and short patterns), such as are used with the bearer companies of the German Army, are employed.

(2) A bicycle for conversion into a wheeled litter. This is said to be the invention of an artisan employed in one of the military depôts. It is an ordinary pneumatic tyred bicycle, the frame of which is jointed and can be bent back so as to bring the fore and hind wheels parallel to one another. Stretcher poles and canvas are then fitted into rings connected with the frame and the apparatus thus converted into an ordinary wheeled litter. The Austrian Army Medical Department are experimenting with the

Berkefeld Field Filter (Bruckner's Pattern).



a—Tube supplying water to pump.

b—Pump.

c—Iron case containing the candle.

d—Lid of case with discharge tube.

N.B.—The water is pumped up through the filter and discharges at the top.

apparatus in the expectation of finding it a useful equipment for stretcher bearers with a cavalry division; the idea being that the bearer can keep up with cavalry along roads, &c., on his bicycle, and when a trooper falls, dismount, convert the bicycle into a litter, the poles and canvas being carried with the bicycle, and so wheel the patient to the collecting or dressing station. It is proposed to equip each cavalry division with ten such bicycle litters.

(3) A field service filter. This consists of the ordinary cavalry canvas bucket, with a block of asbestos pulp, let in at the bottom, and covered with a perforated tin disc. There is a tap in the bottom of the bucket to draw off the filtered water. The asbestos is only intended to clarify, although at first it will keep back micro-organisms, and should be cleaned and boiled from time to time. It is intended to add ·02 grm. of hypochlorite of lime to each litre of water when the water is supposed to be infected with cholera or typhoid germs. The Berkefeld Filter (Bruckner pattern) is also adopted in the Austrian Army for field service, and consists of a single candle on a folding tripod stand with force pump attached, the weight of the whole being about 14 kilos. One filter of this pattern is sufficient for a section or squad, and is calculated to filter about two litres of water per minute, if the filter is thoroughly cleaned every second day. (See drawing.)

XV. *The Relationship of Voluntary Aid to the Regular Army Medical Service in Austria.*

I had collected notes and materials for giving a detailed account of the relationship between the Austrian Army Medical Department and the voluntary aid associations but, although the subject is of much interest and has an important bearing on the working of the medical services in time of war, I find this report has lengthened itself out to such an extent, that I must confine myself to a brief summary of the several duties undertaken by the voluntary aid societies under the regulations of the Austrian Army Medical Service.

1. *The first line of medical and surgical assistance* in the field is supplemented by voluntary aid in the proportion of one "field column" (Feld Sanitätscolonnen), provided by the Deutscher-Ritter-Orden, for each infantry division. This column, although designated as the column of the Deutscher-Ritter-Orden, is not manned but only equipped by the Order, *i.e.*, the Order merely keeps in readiness the wheeled transport and harness, while the personnel, namely 1 corporal and 12 privates of the Medical Staff Corps (Sanitäts-truppe) and 1 corporal and 8 privates of the Army Service Corps (Train-truppe), with 14 horses (2 in reserve), are supplied from the regular army. The wheeled transport as supplied by the Order, consists of 4 two-horse ambulance wagons with stretchers of the regulation pattern and 1 four-horse material wagon for each column.

The column forms an integral part of the "Feld-Sanitäts-Anstalt" of each infantry division, an establishment corresponding to our bearer company, and is the only supplementary voluntary aid allowed in the fighting line.

2. *The field hospitals, forming the second line of assistance*, are supplemented by voluntary aid associations as follows:—

(i) The "Deutscher-Ritter-Orden" will, so far as its funds allow, establish field hospitals of 200 beds each with corresponding transport columns. Four such hospitals, as already mentioned, are maintained at present. The hospitals are designated the "Deutsch-Ordens-Feld-Spitäler" and are numbered consecutively I, II, III, and IV, the transport columns being also distinguished by the number of the hospital to which they belong. The hospital and transport columns are, as in the case of the "Sanitätscolonnen" of the first line, fully equipped by the Order, but only a portion of the personnel is provided. Thus the Order provides the hospital personnel, composed of a hospital commandant, 5 doctors, 1 apothecary, 1 chaplain, 15 nursing sisters belonging to the Order and 3 servants; while the regular army provides a complete Medical Staff Corps detachment (Feld-Sanitäts-Abtheilung) composed of one paymaster, 1 sergeant-major, 1 pay sergeant, 2 sergeants, 6 corporals, 10 lance-corporals, 57 privates and 1 officer's servant; along with 1 conductor, 57 drivers, 1 riding, 110 draught and 4 reserve horses. The wheeled transport of the column, all supplied by the Order, consists of 17 four-horse wagons (16 for hospital equipment and 1 for medical and surgical equipment and medical comforts) with 21 two-horse ambulance wagons with stretchers, &c.

The duty of this voluntary aid transport column is strictly confined to the work of searching for and bringing in wounded to the hospital of the Order *after the battle* and evacuating the hospital to the rear. It is laid down that the column must be accompanied by at least one doctor while searching for wounded It may be noted here that the field hospitals of the regular army in Austria are independent units, the number estimated as likely to be required being in the proportion of one for each infantry division. They are equipped for 600 beds each, and are divisible into three sections of 200 beds each, so that the "Deutscher-Ritter-Ordens" field hospital is equivalent to one-third of the regular service field hospital.

(ii) The Red Cross Association undertake the whole of the transport of sick and wounded to and from the field hospitals *after the battle*; and for this purpose each field hospital of the regular service has attached to it a sick and wounded transport column (Blessirten-Transport Colonnen) of the Red Cross, consisting of 15 two-horse ambulance wagons and 1 four-horse medical and surgical wagon, convertible into an operation tent by means of canvas carried on the roof. The personnel and horses for these columns are supplied from the regular Medical Staff and Army Service Corps, and they are employed in the same way as the transport columns of the Deutscher-Ritter-Ordens field hospital.

(iii) The Red Cross Association also supplements, in the field, the field medical store depôts, and undertakes, in affiliation with these, to supply medical and surgical equipment, transport material, linen, bedding, hospital utensils, and medical comforts for replenishing the first and second lines of assistance.

3. *On the lines of communication* the voluntary aid assistance is confined to :—

(i) The maintenance and formation of supplementary hospital trains, a duty undertaken by the Malteser-Ritter-Orden, which, like the Deutscher-Ritter-Orden manages its own funds, equipment, and personnel apart from the Red Cross Societies. This Order maintains six hospital trains. Each train consists of 10 hospital railway carriages fully equipped with lying down accommodation for 100 sick and wounded, 1 carriage for the staff, 1 kitchen wagon, 1 equipment wagon, and 3 wagons for provisions, stores, &c.* The personnel, all provided by the Order, consists of 1 commandant, 2 doctors, 1 accountant, 10 sick attendants (1 for each hospital carriage) and 2 cooks.

(ii) The formation of rest stations (Kranken-halte-station), which are established by the Red Cross Association, usually near or at railway stations along the lines of evacuation of sick and wounded. The rest stations are of two classes, those equipped for providing refreshment and attending to simple dressings, &c., in the case of sick convoys or trains resting only for a few minutes or hours; and those intended for the reception of sick and wounded resting over night.

(iii) The equipment of hospital ships. The only assistance given by voluntary aid societies in this direction is that already referred to in connection with the hospital ship equipped by the Frauenhilfsverein of Istria at Trieste.

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* Hospital trains also form part of the regular service equipment. Each train is equipped to convey 100 sick of the rank and file and four officers.

4. *In the home territory* (*i.e.*, at the base or in rear of the base) the Austrian voluntary aid societies play an important part in time of war in the following ways:—

(i) In provincial towns local branches of the Red Cross Association organise transport columns for conveying sick and wounded from railway stations to hospitals, &c.
(ii) The Malteser-Ritter-Orden, (as also the Wiener Freiwillige Rettungs-Gesellschaft, in the manner already noted), performs similar transport duties in the city of Vienna.
(iii) The Red Cross Association undertakes the equipment and organisation of large reserve hospitals and convalescent homes for the reception of wounded from the front. Reference has already been made to the use of the Red Cross depôt huts at Vienna and Buda Pesth for this purpose; but an equally important duty undertaken by the Association is to convert barracks vacated by troops sent to the front into reserve or base hospitals. The details for doing this are most elaborate and carefully worked out, so that on mobilisation the work is carried out on a definite plan. Contracts have been made with various firms to supply, when called upon, fixed quantities of equipment, furniture, &c., and a programme of the work done each day is definitely laid down. Thus the work of converting, for example, the Franz Joseph Barrack in Vienna, into a hospital for 20 officers and 500 men, in 1 surgical and 4 medical divisions, is completely mapped out according to days and hours, in such a way that the barrack would be ready to receive sick and wounded on the 21st day after mobilisation, with full establishment of trained hospital staff and equipped with every hospital requisite.
(iv) Reserve depôts of medical and surgical equipment are also formed in the various towns by the Red Cross Association.
(v) Bureaux are established for communicating with the friends of the sick and wounded.
(vi) Arrangements are made for receiving patients into private houses.
(vii) Pecuniary assistance is given to indigent invalids and their families.

XVI. *Conclusion.*

In bringing this report to a close I desire to acknowledge my deep obligations to the Central Committee of the Austrian Red Cross Association, to the Deutscher-Ritter-Orden and Wiener Rettungs-Gesellschaft, as well as to the Director-General of the Medical Department of the Imperial Army of Austria-Hungary, for the ready courtesy with which sources of information were placed at my disposal. To Dr. de Farkas of Buda Pesth I am specially indebted for my visit to that city.

APPENDIX No. V.

REPORT ON THE NINTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

(Including a Report on Vaccination in the French Army.)

By Major W. G. MACPHERSON, M.A., M.B., Royal Army Medical Corps.

The 9th International Congress of Hygiene and Demography was held in Madrid between the 10th and 17th April, 1898, according to the official dates, but the proceedings actually commenced on the 9th and lasted practically till the 18th or 19th of the month.

The work of the hygienic division of the Congress was carried out in ten sections, of which one, the 8th section, was devoted to military and naval questions. The Demography division contained three sections.

All the sections met in the "*Palacio de Bibliotecas y Museos nacionales,*" a building admirably adapted for the purposes of a large International Congress.

The various receptions arranged in honour of the occasion were marked by a splendid hospitality on the part of the Government, military, civil and private institutions; while their Majesties, the King and Queen Regent of Spain, received the whole of the members of the Congress, numbering some 2,000 individuals, at the Royal Palace. Her Majesty entered freely into conversation with the delegates and other representatives of foreign countries at this reception, and in conversation with the British delegates spoke with manifest interest of the work that was then being carried out in India in connection with the plague and the north-west frontier campaign, making many enquiries regarding the Royal Victoria Hospital, Netley, and the Queen's visit to the sick and wounded invalids there.

Notes have already been published in the weekly medical journals on the more important papers read in sections other than the Military Section. A point of special interest to our Army Medical Service was the recognition of the fact that the germs of such diseases as typhoid and Mediterranean fevers may be present long after convalescence in the urine, but the practical difficulties of dealing with this form of disease distribution are acknowledged to be very great at present. A statement made by Löffler regarding the bacillus of diphtheria is also of special interest. He informed us that many bacilli existed identical morphologically and in culture reaction with the pathogenic diphtheria bacillus, but that it is impossible to determine by ordinary microscopic or culture examination whether they are the bacilli of true diphtheria or not. The only certain method of doing so is by inoculating animals. This has considerable bearing upon recent extensive and mild epidemics of so-called diphtheria in the Belfast and Aldershot garrisons, where the disease was diagnosed by bacteriological methods, which apparently did not include inoculations into animals.

These are, however, only one or two of the many points of general interest which were discussed in the various sections of the Congress, but as the others do not specially affect the Military Medical Services, they need not be alluded to further in this report.

Apart from having on the invitation of Dr. Brouardel, the President of the International Permanent Committee, acted with Dr. Macalister of Cambridge, as an extra-ordinary member of the Committee during the Congress, I confined myself entirely to the work of the military section and to visiting hospitals, barracks and other military medical institutions in Madrid

PAPERS READ IN THE SECTION OF MILITARY AND NAVAL HYGIENE.

The section of military and naval hygiene was attended by representatives of the military and naval medical services of Germany, France, United States (America), Holland, Italy, Norway, Switzerland, Japan, and Turkey, in addition to a large number of medical officers of the Spanish army and navy.

The papers read in the section were of considerable interest. It would be impossible in a brief report to enumerate the points in them all, but the following deserve special notice :—

1. A paper on the prevention of typhoid fever in the French army, by Professor Richard, Professor of Military Hygiene at the Ecole d'application du service de santé militaire, Paris.
2. Foot œdema in soldiers, by Oberstabsarzt Stechow (Prussian army).
3. Prevention of disease in tropical expeditions, by Dr. Cunéo, Director-General of the French Naval Medical Service, and by Dr. Caro, (Spanish navy).
4. Prophylaxis of tuberculosis in the Army and Navy, by Dr. Caro (Spanish navy) and Dr. Arioz (Spanish army).
5. On the necessity of disinfecting the water tanks of infected ships, by Dr. Yabó (Japanese navy).
6. On the military hospitals in the Island of Cuba, during the recent rebellion, by Dr. Angel de Larra Cerezo (Spanish army).

Prevention of Typhoid Fever in the French Army.

Professor Richard's paper dealt mainly with the results of the steps which have been taken in France during the past two or three years to prohibit soldiers entering the *cabarets*, etc., outside barracks, in those towns where typhoid fever is said to be endemic, and where the garrisons have suffered severely. The experience gained in France by isolating in this way the garrison from the civil population is most interesting. Certain garrison towns, such as Lure, Evreux, Castres and Chateaudun, where the experiments were made, used to be notorious for the number of typhoid cases that occurred in them. Pasteur filters and, latterly, water sterilizing apparatus of the Rouart or Vaillard pattern were installed but without permanent results. Consequently, from the middle of 1896 onwards the soldiers in these towns have been prohibited from entering any of the civilian *cabarets*, and the results have certainly justified these extreme measures of prevention. In Lure for example only two cases of enteric fever, according to Professor Richard, have occurred since then, and what is still more remarkable other infectious and contagious diseases have also disappeared. In illustration of the latter point Professor Richard submitted the following statistics of the garrison at one of these stations (Chateaudun) :- –

A. Admissions for infectious and contagious diseases during the period previous to prohibiting soldiers entering the cabarets.

Years.	Influenza.	Enteric fever.	Measles.	Scarlet Fever.	Mumps.	Erysipolas.	Proportion of admissions per 1,000 of strength of garrison.
1886-90	12	20	7	10	3	9	161·00
1891-95	11	66	18	37	36	4	167·22
1896 (1st half) ..	3	107	—	1	—	—	197·86

B. Admissions since prohibiting soldiers entering the cabarets.

Years.	Influenza.	Enteric fever.	Measles.	Scarlet fever.	Mumps.	Erysipelas.	Proportion of admissions per 1,000 of strength of garrison.
1896 (2nd half) ..	—	—	—	—	—	—	0·00
1897..		—	—	—	1	—	1·25
1898..		—	—	—	—	—	0·00

It must be admitted that the experiment has not yet been carried on for a very long period but the results are, nevertheless, important, and throw much light upon the probable sources of disease in garrison towns. Naturally much indignation has been aroused amongst the civil municipalities in consequence of the action of the military authorities, but, as Professor Richard remarked, in the long run these measures will react to the good of the civil population, as they will force the municipal authorities to realise the necessity of improving the sanitary condition of their towns, and of providing them with pure water supplies, etc. In garrison towns of prefectures or sub-prefectures an Army Medical Officer is an *ex-officio* member of the Civil Sanitary Board, and measures of this kind are consequently likely to be enforced in them. In connection with this subject, Professor Richard, who is one of the most enthusiastic advocates of total abstinence in the army, spoke in a most appreciative manner of our system of regimental canteens and recreation rooms, as a means of preventing not only infectious disease but also alcoholism, pointing out that, where such a system prevails, soldiers have not the same inducements to spend their time in insanitary grog shops.

Foot œdema in soldiers.

Dr. Stechow's paper on foot œdema in soldiers deals with a complaint that seems much more common in continental armies than in our own. The disease is a thickening or swelling of the feet which has been noticed chiefly amongst young soldiers, and which has, until recently, been regarded as either a swelling of the soft parts, or as due to rheumatic or other forms of periostitis of the metatarsal bones or to strain and inflammation of ligaments or tendons. Dr. Stechow's paper was an account of his investigations into this condition with the aid of Röntgen rays. Between July, 1897, and March, 1898, he found that in 35 cases, out of many examined, there were thickenings or irregularities of the metatarsal bones. In 31 of these cases the Röntgen rays disclosed distinct fracture. In most, the fracture was limited to one or other of the metatarsal bones, but, in a few, more than one bone was affected. Thus there were 36 fractures altogether in the 31 cases –19 of the fractures were fractures of the second metatarsal bone; 14 of the third; 2 of the fourth and 1 of the first. The single case of fracture of the first metatarsal occurred in an artilleryman who attributed it to his horse coming down with him. All the other cases occurred amongst infantry soldiers, and with the exception of 9, for which no cause could be assigned, they were attributed to sprains, blows, gymnastic or other military exercises. Dr. Stechow points out that there is little pain when the injury is first obtained, and that the condition is overlooked until a continuance of the exercises causes it to become aggravated. His theory of the causation of fracture is that the slenderer metatarsal bones get nipped between the stouter and more rigid first metatarsal bone and the unyielding structure of the boot, when there is any sudden jerk or irregular action, and he urges careful attention to the feet and boots of young soldiers.

defects in which he considers, are often the cause of such injuries, especially during the earlier training of the soldier. The result of his systematic examination of the feet with the Röntgen rays would appear to prove that fracture of the metatarsal bone is far more frequent than is supposed, and that it must be regarded as an injury specially incident upon military training. In all cases of swelling of the feet a careful examination should be made to detect any tender point over the metatarsals, and fracture should be suspected in such cases. Dr. Djiewonski (Paris) and Dr. Espina (Madrid) referred in this connection to photographs which they had taken showing deformities of feet caused by defects in boots, but neither seemed to have gone as far as Dr. Stechow or to have detected fracture of bone.

Prevention of disease in tropical expeditions.

Dr. Cunéo's paper on the prophylaxis of disease in tropical expeditions was mainly concerned with the purification of water supplies and with a description of a modification of the French regulation pattern soldiers' water bottle (*bidon*), as proposed by M. Lepeyrer, with a view to providing it with a filter and sterilizer. Sterilization, according to M. Lepeyrer's method, is effected by a sterilizing powder which is carried in a small case "let in" into the structure of the bottle. The cork of this case holds a small spoon or measure whose capacity is equal to the quantity of the powder required to sterilize a litre of water, the quantity of water which the water bottle contains. The powder recommended by Dr. Cunéo contains permanganate of potash, as the sterilizing agent, lime and carbonate of soda as alkalies to improve the taste, and alum to help in precipitating suspended matter. The spoon measure in the cork contains 0·30 gramme of this powder, of which 0·05 gramme is permanganate of potash. M. Lepeyrer's arrangement for filtration is in the cork of the bottle. The cork carries a hollow metal cylinder containing a roll of felt or flannel, through which the water is sucked by means of a teat inserted through the cork into the cylinder. The principle of making each man, by such simple means, himself sterilize and filter the water he drinks, may be sound in a way, but at present it is somewhat Utopian to suppose that any real benefit will result from entrusting such details of water purification to the individual soldier. It is, after all, only the most technical and specialized education that will induce any individual to adopt voluntarily and intelligently precautions of this nature.

Dr. Caro of the Spanish navy also read a paper on a similar subject. He pointed out that, to avoid disease in tropical climates, only those soldiers should be sent abroad who are possessed of the maximum of resistance to disease, and that no effort should be spared to maintain this condition of resistance after their arrival in unhealthy climates. He urged therefore the necessity of (1) more strictness in recruiting and the exemption from military service abroad of those soldiers who do not appear to have sufficiently strong constitutions; (2) of improving the conditions under which soldiers are conveyed by sea; (3) of limiting to as short a period as possible the duration of campaigns in notoriously unhealthy climates; (4) of holding military and medical authorities strictly responsible that the rules of hygiene in all that concerns the food, clothing, and habits of life of the soldier, the sites and construction of barracks, hospitals, etc., local sanitary improvements and so on, are rigidly adhered to; (5) of establishing sanatoria in suitable places for convalescents whom it is undesirable or unnecessary to invalid home; (6) of establishing a permanent service of hospital ships for the transport home of invalids from tropical climates in time of peace and of the sick and wounded in time of war.

Prophylaxis of tuberculosis in the Army and Navy.

The paper of Dr. Caro and Dr. Arioz on the prophylaxis of tuberculosis in the Army and Navy excited much interest amongst the representatives of the medical services of the continental armies. Dr. Caro remarked that the disease claimed more victims than any other disease amongst the Spanish soldiers and sailors, and that they suffered more, in proportion, than the civil population. The German, French and Italian Medical Officers also spoke of tuberculosis as one of the scourges of the large armies of the continent, and all practically agreed that prophylaxis mainly depended on preventing tubercular subjects being enlisted and entering barrack rooms. The measures of prophylaxis recommended in this direction were :—

1. Careful investigation into the family history of each recruit. Any tendency to tuberculosis in the recruit, although he should otherwise be healthy, should be noted, and he should be specially watched and examined from time to time. This investigation into family histories is already part of the regular routine examination of recruits in Germany, and Professor Richard stated that a similar regulation will shortly be put in force in France.
2. Systematic examination of the thorax and especially of its antero-posterior diameter, and of the physical equivalents of chest girth, age and weight.
3. Systematic microscopic examination of the sputum of recruits who are believed to have an hereditary tendency.
4. Immediate discharge or temporary invaliding to their homes of all in whom the tubercle bacillus is detected.
5. Isolation in special wards of all cases of tuberculosis under treatment in hospital, or of cases suspected of being tubercular. This measure is already adopted in the Spanish military hospitals, where there are special wards for tubercular patients.

In our army the subject of prophylaxis of tuberculosis, at any rate on these special lines, has not obtained the same prominence, but one can readily understand the importance of such measures in the recruiting of armies, where compulsory service is in force.

Disinfection of water tanks on board ship.

Dr. Yabé's paper on the necessity of disinfecting the water tanks of infected ships was concise and practical, and described an outbreak of typhoid fever on board the Japanese ship "Yamato" at Formosa in 1898. Fifty-five of the crew, or 20 per cent., were attacked; and the vessel was then sent to Nagasaki to be disinfected. The usual method of disinfection was employed at first. All parts were washed with 10 per cent. solution of lime, and the interior parts with a 20 per cent. solution of carbolic acid. Lime was pumped into the bilges, and the water tanks were emptied and cleaned. Hammocks, etc., were disinfected in a steam disinfecting apparatus and other articles steeped in solutions of carbolic acid. Notwithstanding these measures, cases continued to occur amongst the crew; and it was eventually decided to disinfect the water tanks with steam. This was effected by passing currents of steam from the boilers through the tanks, and Dr. Yabé stated that a complete cessation of the outbreak resulted. He recommends that all ships should be fitted with means of disinfecting water tanks in this way, and said that on the new Japanese cruiser "Luma," it is intended to instal a pipe to conduct steam from the boilers to the water tanks for this purpose, and that in all Japanese ships the steam baths will be arranged so that they can be utilized as steam disinfecting chambers when required.

The Spanish Army Medical Service in Cuba.

Dr. de Larra Cerezo's statement of the work done by the Spanish Army Medical Department in Cuba since the commencement of the war against the insurgents, forms a small volume of 40 pages of printed matter with 19 plans and graphic charts. It is an admirably prepared document, full of interest and valuable information.

Hostilities commenced early in 1895, and at that time the only military hospitals in the island were those at Habana, Santiago de Cuba, Santa Clara and Puerto Principe, with regimental hospitals in nine of the detached garrisons, whose sick, on account of the difficulties of transport and communication, could not be transferred to the larger hospitals.

On the outbreak of the rebellion the island was divided into six administrative provinces for military purposes, with a Principal Medical Officer of the rank of sub-inspector (Colonel) in medical charge of each, namely, Habana, Pinar del Rio, Matanzas, Santa Clara (Las Villas), Puerto Principe (or Camaguëy), and Santiago de Cuba.

The Medical Department at once set to work and established month by month during 1895 a large number of hospitals throughout the island. Thus in March and April three hospitals were opened, namely, at Bayamo, Holquin and Placetas (the two former in the interior of Santiago de Cuba, the Eastern province, and the last in Santa Clara, the Central province).

In May a fourth hospital was established at Victoria de las Tunas in the province of Puerto Principe. In June, nine more were opened in different parts of the island, in July four, in September four, in October one, in November one, and in December two.

About thirty more hospitals were opened in 1896, and about ten in 1897; so that the hospital accommodation for the troops during the three years of the rebellion had increased from 2,500 beds in February, 1895, to 45,685 at the beginning of 1898.

The largest hospital in the island is the hospital at Regla on the eastern shore of the Bay of Habana, facing the capital, which originally had 3,600 beds, but which was increased to 5,000 by the end of 1896. Next come the modern military hospital, called the hospital of Alphonso XIII, on the outskirts of Habana, and the hospital at Manzanilla in the province of Santiago de Cuba, each with 3,000 beds, the hospital of the Beneficiencia in Habana (2,100 beds), and the hospitals at Santiago de Cuba and Sancti Spiritus (in the province of Santa Clara), each with 2,000 beds.

In addition to these immense establishments, there were several other military hospitals scattered throughout the island with more than 1,000 beds each. Thus at the beginning of the present year the military hospitals in Cuba consisted of 30 large general hospitals, the number of whose beds ranged from 500 to 5,000, and 5 smaller general hospitals, 28 subsidiary hospitals (*Clinicas*) and 11 regimental hospitals, with beds varying from 20 in number to between 400 and 500.

The following figures indicate the work thrown upon these establishments:—

In 1895 (March to December) the number of sick admitted into the military hospitals was	49,485
In 1896 (January to December)	232,714
In 1897 (January to June)	201,247

The mortality amounted:—

In 1895	to 3,200
In 1896	„ 10,610
In 1897 (1st half year)	„ 3,691

or a total of 17,501 deaths out of 483,446 admissions, equal to a case mortality of 3·6 per cent.

During the first year of the war nearly 200,000 troops arrived in the island and a large proportion went sick within two months of landing.

The chief causes of admission to hospital were yellow fever, malarial evers, dysentery, typhoid fever, tuberculosis and wounds.

Yellow fever caused	7,034	admissions in	1895
„ „ „	23,580	„ „	1896
„ „ „	4,636	„ „	1897 (1st half)

or a total for the whole period of 35,250, of whom 11,347 died, namely, 2,777 in 1895, 7,309 in 1896, and 1,261 during the first half of 1897.

In discussing the subject of yellow fever Dr. de Larra Cerezo presented a valuable table showing the monthly admissions and deaths from yellow fever amongst the Spanish troops in Cuba for each year during the period 1880 to 1897. In no year were the troops free from the disease, the number of admissions, before the war, varying from a minimum of 120 in 1885 to a maximum of 1,470 in 1880; and the case mortality from 22·10 per cent. in 1892 to 55 per cent. in 1885. In the years of the war, 1895, 1896, and the first half of 1897, the admissions and deaths have been stated above. The case mortality in each of these years was 39·46, 30·99 and 27·20 per cent. respectively. As regards monthly distribution of the disease, with the exception of the year 1886, when, during the first five months of the year the only admissions were one in February and one in March, cases of yellow fever occurred at all times of the year; and the relative frequency of the admissions by months during the period 1880–96 works out as follows.—

(The statistics for 1897 are omitted, as Dr. de Larra Cerezo gives the figures for the first six months only).

Monthly distribution of Yellow Fever cases amongst Spanish troops in Cuba. (1880–96).

	Total number of admissions.	Total number of deaths.	Percentage of admissions to total admissions.	Percentage of deaths to admissions.
January	1,548	215	3·56	20·3
February	525	186	1·25	35·4
March	584	147	1·35	25·1
April	665	265	1·53	30·9
May	1,646	483	3·77	29·4
June	3,962	1,193	9·10	30·1
July	7,081	2,224	16·25	31·4
August	5,115	2,136	11·75	41·7
September	5,575	1,640	12·80	29·4
October	6,131	2,020	14·08	32·9
November .. .	6,177	1,930	14·12	31·2
December	4,543	1,071	10·44	23·5
Total (1880–96) ..	43,552	13,510	100·00	31·0

Yellow fever has, accordingly, been mainly prevalent during the last six months of the year, the disease apparently beginning to show activity in June, coming to a height in July and continuing with little intermission till the end of the year, when there is a somewhat sudden cessation of activity. The case mortality would appear to fall also somewhat suddenly at the end of this period of activity, but rises and falls irregularly during the earlier months, when the disease is more or less quiescent.

The admissions for malarial fevers, dysentery, typhoid fever and tuberculosis are recorded in Dr. de Larra Cerezo's paper for the second half of 1896 and the first half of 1897 only.

For malarial fevers the number of men admitted during this period was 79,552, of which 515 died; typhoid fever caused 2,903 admissions and 576 deaths, dysentery 4,200 admissions and 461 deaths, and tuberculosis 2,281 admissions and 299 deaths.

The number of wounded treated in the various hospitals was 1,989 in 1895, 7,270 in 1896, and 2,643 in 1897; or a total of 11,902, of whom 363 died, equal to a case mortality for wounds of 3·05 per cent.

One may gather from these few statistics that the work of medical officers of the Spanish army in Cuba was truly enormous. Their personnel consisted of one 1st class inspector-general and one 2nd class inspector-general, eight 1st class and sixteen 2nd class sub-inspectors, 67 surgeon-majors, 169 surgeon-captains, and 180 surgeon-lieutenants, in addition to about 70 doctors temporarily employed and more than 100 civil surgeons, mostly natives of Cuba.

The pharmaceutical branch of the Army Medical Department was represented by 66 officers of all ranks of apothecaries, 10 temporarily employed, and 12 civilians.

Before the war the Army Medical personnel in the island consisted only of one 2nd class inspector-general, one 1st class and one 2nd class sub-inspector, 15 surgeons of the rank of major, and 43 surgeons of the rank of captain. Altogether more than 600 Army Medical Officers and 100 apothecaries were sent from Spain to Cuba during these years, and of these 50 medical officers and 6 apothecaries lost their lives, the majority from yellow fever; four, however, were killed in action, and 25 were wounded.

The amount of medical and surgical equipment supplied by the Army Medical Park and Central Laboratory in Madrid is also recorded in Dr. de Larra Cerezo's paper. Amongst the matériel sent from the former, 14 ambulance wagons (of the Austrian or Lohner pattern), 42 field-surgical panniers, 41 field companions, 26 cavalry surgical bags, and 178 reserve surgical panniers, and more than 1,000 stretchers are included in addition to a large quantity of minor equipment.

The Central Laboratory supplied amongst other medical and surgical matériel close on 190,000 first field dressings, 16,000 bandages, 20,000 gauze compresses, some tons of the more important medicinal agents, more than 25,000,000 tabloids of various drugs; nearly 200,000 lbs. of absorbent antiseptic wool and more than 545,100 yards of sterilised antiseptic gauze. It is not necessary to burden this report with further details, of which Dr. de Larra Cerezo's paper is full. Enough has been stated to indicate how anxious and arduous must have been the work of the Spanish Army Medical Service during the years of the recent rebellion in Cuba, and how efficient must their hospital management, equipment and treatment of sick have been. Confirmation of this opinion has recently been published by a German naval medical officer, whose remarks upon the Hospital of Alphonzo XIII at Habana are most laudatory.*

NOTES ON THE SPANISH ARMY MEDICAL SERVICE.

Personnel.

The medical department of the Spanish Army is organized as a distinct corps, the "*Cuerpo de Sanidad Militar*," and includes medical officers, apothecaries, and non-commissioned officers and men, who are divided for administrative purposes into four independent brigades, namely, the Peninsula, Puerto Rico, Cuba, and the Philippines brigades.

The medical officers and the apothecaries hold officers' rank but do not possess combatant titles.

The titles and corresponding military ranks of the former are: (1) inspector de primera classe (major-general); (2) inspector de segunda classe (brigadier-general); (3) sub-inspector de primera classe (colonel); (4) sub-inspector de segunda classe (lieutenant-colonel); (5) medico-mayor (major); (6) medico-primero (captain); and (7) medico-segundo (lieutenant).

The number of medical officers in each brigade at the beginning of 1898 was 443 in the Peninsula, 500 in Cuba, 150 in the Philippines and 30 in Puerto Rico. In the Peninsula, which includes the mother country and the Spanish possessions in Africa, the numbers in each rank are 2 in the highest rank, 9 in the second, 17 in the third, 28 in the fourth, 104 in the fifth, 185 in the sixth, and 98 in the lowest or subaltern rank.

The medical officers wear a smart dark blue uniform (undress and full dress), similar to the infantry uniform, with kepi head-dress. Their distinctive badge is an olive branch wreath worked in gold on the collar, and a double red stripe on the trousers. The apothecaries, whose highest rank corresponds with brigadier-general, have a similar uniform but with a double purple stripe, as a distinctive mark, on the trousers.

Badges of rank are on the sleeve. A lieutenant wears two stripes in gold with two six-pointed stars above the stripes on each sleeve; a captain three stripes and three six-pointed stars; a major one gold and one silver stripe with one gold and one silver eight-pointed star below the stripes; a lieutenant-colonel the same as a major but both stars and stripes in gold; a colonel the same as a lieutenant-colonel but three, instead of two, eight-pointed stars and stripes. The brigadier-generals and major-generals wear a shoulder sash of white watered silk with two thin red stripes.

Commissions are obtained by competitive examination, the candidates being fully qualified medical practitioners. Apothecaries must also pass the qualifying examination for pharmacists before competing for commissions, pharmacy constituting a separate faculty in the Universities of Spain and being regarded as one of the learned professions.

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* *Vide* translation of a portion of a report by Staff-Surgeon Kuge of the German Navy, in the *Journal of Tropical Medicine*, September, 1898.

The non-commissioned officers and men of each brigade are divided into two sections, the foot section (*seccion a pie*), and the mounted section (*seccion montada*). The duties of the former are confined to hospitals, of the latter to the transport of sick and wounded. Each brigade is commanded by a medical officer of the rank of colonel who is on the head-quarters staff of the army, and the sections are divided into companies, one company of the foot and one company of the mounted section being allotted to each military hospital in the larger garrison towns. The foot companies are officered directly by captains and lieutenants promoted from the ranks of the company, the mounted section by a medical officer of the rank of captain with a medical officer of the rank of lieutenant under him.

On mobilization these sections form the bearer company and field hospital establishments, their place on the peace establishment being taken by reservists.

All the animals required for ambulance transport form part of the mounted section of the "*Cuerpo de Sanidad*," and the men have the same stable duties to perform as in other mounted branches of the service. The stables and barracks are at the military hospitals, the mounted occupying different barrack rooms from the foot companies.

The men of both sections wear similar uniform, long tunic and infantry trousers, with the distinctive olive branch wreath on the collar of the tunic, but the mounted section have steel leg guards and carry a short broad sword or *machete* instead of the light sword worn by the foot section, while the non-commissioned officers of the mounted section carry a heavy cavalry sword.

The ward orderlies (*practicantes*), as also the infantry soldiers in Spain, generally wear a fatigue dress of khaki drill, up till recently of striped cotton, and while actually engaged in ward work, wear in addition white cotton sleeve protectors and aprons.

The strength of the rank and file of the Peninsula brigade (*Primera brigada*), is at present 1,045 non-commissioned officers and men.

Each Army Corps in the field has three foot and three mounted companies, one for each division and one for the "staff troops." In addition each regiment has a medical officer attached to it, and two men per company are trained as stretcher bearers. The lines of medical aid in an engagement are:—(1) *Posto de socorro* (collecting station); (2) *posto de primera curacion* (dressing station); (3) *hospedal provisional* (field hospital).

Equipment.

The medical and surgical equipment for field use in the Peninsula is kept at the several army corps headquarters, that for Madrid at Pardo, some miles distant from the city; but a large quantity of field equipment for issue to troops abroad is maintained at the "*Parque de Sanidad Militar*" (the Army Medical Park) situated in the Calle Palos de Moguer, near the Southern railway station.

Each soldier carries a first field dressing consisting of two small pads impregnated with a hæmostatic agent (perchloride of iron solution) two gauze compresses, a gauze roller bandage folded flat, a piece of waterproof cloth and a triangular bandage with two ordinary pins and one safety pin. The materials are also impregnated with carbolic acid or mercuric chloride and are wrapped in a cover of khaki drill, firmly stitched. Scissors, knife, or other cutting instrument is required to open it, and the package is somewhat bulky, measuring approximately 4½ inches by 3 inches by 1 inch. The materials are, however, good and useful. With each company of infantry there is a "*bolsa de ambulancia*," a leather case containing tourniquets, orderlies' dressing case, gauze bandages, compresses, cotton wool (carbolised), triangular bandages, light splints, pins, thread, wax candles and matches, etc., but no drugs. In addition, each battalion of infantry carries a '*Mochila de ambulancia*" (field companion) and a pair of medical and surgical panniers or boxes (*Botiquines de Cirurgia*).

The *Mochila de ambulancia* is a leather or hide case, similar to but larger than the "*bolsa de ambulancia*," and contains in addition to the articles in the latter a case of amputating instruments, writing materials, and some minor articles. It is carried over the shoulder by one man.

The *Botiquines de Cirurgia* are strongly made iron bound wooden boxes painted dark green and measuring approximately 1 foot by 1 foot by 2 feet. They are intended for carriage on a mule, and along with pack saddle and a water barrel of about 6 gallons capacity, which is placed on the top of the pack saddle between the boxes, the load weighs 109 kilogrammes, approximately 240 lbs. They form a good useful equipment and carry a considerable quantity of dressing material and surgical instruments of excellent quality and description, all the instruments being of the most modern "aseptic" type. The dressings consist chiefly of absorbent wool and gauze.

There are also reserve surgical panniers (*Repuestos de Cirurgia*) which are similar to the *Botiquines de Cirurgia*.

The mounted branches of the service are provided with a pair of leather saddle bags (*Bolsas sanitarias de Grupa*) containing materials similar to that of the "*bolsa de ambulancia*" of the infantry. These cavalry bags are stout leather wallets, opening at the top only.

Medicines are also carried in pharmacy waggons, which are of a simple and convenient construction, the back and sides forming cupboards, in which the various bottles are firmly fixed one-deep in shelves and racks, while the centre of the waggon forms a hollow or bucket, for the reception of any additional equipment that it may be desirous to carry.

Among articles of equipment that appeared specially simply and useful, I noted the field splints and field operating table. The former are light boards of soft wood, cut in convenient lengths of 1½ to 2 feet. Each splint has at one end a fishing rod joint, formed by a flat tin ferule covering the bevelled end of the splint, and the other end is cut obliquely to fit in to the joint of any other piece. Splints of any length can thus be made by joining separate pieces together. These splint pieces are cheap, easily made, light and convenient for carriage.

The field operating table is also a simple construction of wood, folding perfectly flat. It has no unnecessary accessories or complicated jointing and is remarkably light, the surface of the table being open work of five narrow boards joined longitudinally to the frame at intervals of 2 to 3 inches from one another.

The chief feature of both splints and table is their cheapness and simplicity of structure, while at the same time they meet all the requirements of portability for field service.

Sick Transport.

The material for the transport of sick and wounded consists of :—

(1) *Stretchers.* (*Camillas de Campaña*).—The Spanish stretcher is formed of an open canvas sack into which two round poles of beech wood are slipped. The traverses are unjointed galvanized iron rods with legs attached and with hollow cylinders for receiving the poles. The end of the canvas is sewn round the traverse at the foot end of the stretcher, and is thus inseparable from it. The head traverse is a separate piece and contains, in addition to the legs and cylinders for the poles, a head rail frame, the head end of the canvas being split into two flaps of about 1 foot long each, the upper flap buckling over the head rail with the lower flap which passes under the traverse. This arrangement fixes the head traverse and forms at the same time an inclined plane as head rest for the patient. The poles are fixed in the rings of the traverses by a bayonet joint.

The stretcher is folded up for transport by removing the poles and head traverse, and folding the latter in the canvas, to which the foot traverse remains attached, thus forming a small flat package, while the poles are carried separately. The weight of this stretcher is 9 kilos. (approximately 20 lbs.) or, with the two leather slings, 11 kilos. (24 lbs). It is a useful and simple stretcher, easily repaired and manufactured. Its price in Madrid is 45 pesetas 80 centimes, or £1 16*s.* 0*d. at par.*

(2) *Litters* (*Camilla-litera*).—The litter is the ordinary stretcher with a canvas cover added. The cover is carried on a simple frame of galvanized iron, consisting of two iron rods at each end, which are slipped on to the pole handles, and are united together in a key joint at the free ends by another rod which forms the ridge of the cover. The cover has ventilating apertures let in near the head and foot of the canvas similar to the ventilating apertures placed in window frames. The price of a Camilla-litera in Madrid is 102·65 pesetas or approximately £4 *at par*.

(3) "*Bearing seats*" (*Silla de sueca*).—The pattern used is an improvement on the "*Mandil de socorro*" described on page 140 of the second edition of the "Manual of Ambulance Transport," and costs in Madrid 13·10 pesetas (10*s.* approximately).

(4) *Wheeled transport.*—The type of ambulance waggon adopted in the Spanish service is the new Austrian pattern (Lohner's pattern) slightly modified; *i.e.*, the sides, instead of being of canvas, are wooden panels which can be opened or shut for light and ventilation at will. The Spanish medical officers found the canvas sides very unsuitable for their climate, permitting dust to get into the interior as well as being hotter and less serviceable than wood. The waggons are painted dark green, and are good useful waggons, carrying four stretchers each in two tiers, the stretchers being slung on leather slings fixed to small wheels which run along a rail and carry the stretcher forward to its place. Many of these waggons are in use at the various garrison towns and are kept in readiness for army corps on mobilization. Thirteen were sent to Cuba during the present war, and were used where roads were available. Altogether there are 62 of the new pattern waggons at present in Spain. Each waggon is drawn by a team of four mules, ridden by drivers of the "*Seccion Montada*" of the Army Medical Corps. There are also some old pattern ambulance waggons, which resemble the Spanish stage coaches and which would be drawn by a team of six or more mules. They are large cumbrous vehicles and carry six stretchers in 3 tiers. There are now only 12 left in the Army Medical Park, and they are practically obsolete.

(5) *Pack Transport.* Cacolets (*Artolas*) are used in Spain and are similar to the pattern in use in our own army.

Military Medical Institutions in Madrid.

The Army Medical Park in Madrid contains a very considerable supply of equipment of the above character for field service all neatly arranged and in perfect order in four large, well lighted halls. At the time of my visit to the park there were approximately in the stores some 2,000 stretchers and a smaller number of litter frames and covers, havresacks and field surgical panniers for an army corps of 25,000 men, also the saddlery and harness for the ambulance and pharmacy waggon teams, each ambulance waggon having a set of four saddles (two riding and two harness saddles), kept together on saddle racks and stands. There were also pack saddles for the surgical panniers, cacolets, etc., and 80 field hospital tents and other equipment. I was much impressed with the apparent excellence of the material used in the manufacture of the several articles, and especially with the leather work, which seemed good, strong and supple, and which was kept in perfect preservation.

The other military medical institutions in Madrid which deserve special notice are the Central Laboratory and the military hospital at Carabanchel. Detailed information regarding them will be found in the "Guide Militaire de Madrid," which was published for the use of the members of the military section of the Congress, and further information regarding and illustrations of the Central Laboratory will be found in the descriptive historical sketch recently sent to me, which has also recently been published. It may be briefly noted here that the Central Laboratory forms one of the most important institutions of the Spanish Military Medical Service. The administration and work of the laboratory is carried out by the pharmaceutical branch of the service and is calculated to have caused an immense saving to the State, as compared with the old system of obtaining surgical and medical material from private firms. All the medicines and surgical dressings, &c., for the supply of the army are prepared in it and issued from it; while subsidiary laboratories form part of the military hospital establishments. The amount of care and attention bestowed upon this branch of the service in Spain is very marked, and any Army Medical Department which contemplates manufacturing and supplying its own drugs and dressing material would learn much by a careful study of the details of the system in Spain.

The military hospital at Carabanchel is situated on a bare open plateau about 3 miles (5 kilometres) from Madrid and is of recent construction. It is an extensive establishment originally constructed for 500 beds and is the sole military hospital for the Madrid garrison. The general arrangement of the pavilions, &c., is shown in the photographs in the guide book. The administration block at the entrance to the hospital contains elegantly furnished offices for the principal officers, and suites of rooms for the treatment of sick officers of general's rank. The pavilion facing it is constructed entirely for officers. It is double-storied, and contains a series of bright and airy one-bed wards, each opening on to a wide, well-lighted verandah, with two bath-rooms, and two modern flush-down water closets at either end.

Four pavilions of 2 storeys each form the medical section, and two 1-storey pavilions, the surgical section. On each floor there are two large general wards for 20 beds each, with one 4-bed and two 2-bed wards for special cases. Bath-rooms, containing two marble baths, a water-closet, and an ablution room are placed at each end of the block. The two surgical blocks are connected by long semi-circular passages with the operating theatre which is placed between but at some distance from them. This theatre, a special feature of the hospital, is an enormous glass construction like a palm house, with an instrument room, a room for storing material for surgical dressings, a room for surgical apparatus, a dark room for photography, a bath-room and a chloroform room, as accessories. The operating theatre is warmed with five hot water radiators, and is equipped with glass operating tables, instrument stands and sterilizers. The chloroform room contains a wheeled litter, and generally the construction and equipment of this portion of the hospital are of the most modern type. There are also small wards in the centre of each of the surgical pavilions constructed and fitted as small operating theatres for minor operations.

Pavilions for infectious diseases are isolated from the general hospital grounds, but are inside the same enclosure on the side furthest from the entrance. There are also special wards for ophthalmic cases. The wards generally are extremely bright and airy and have an air of cleanliness and comfort which cannot well be surpassed. The floors are concreted and the walls enamelled, the corners being rounded off. The ceiling is vaulted and contains ventilating apertures. Warming is effected by hot water radiators throughout, and electric light is used for lighting, oil lamps being also provided in case the electric light fails. The bedsteads are of iron with spring mattresses, and the bedding and clothing of the patients looked comfortable and suitable.

The kitchen, pack stores, dispensary, &c., are all in one long two-storeyed pavilion placed between the medical and the infectious diseases blocks. Cooking is by steam and under the supervision of one of the sisters of the Order of San Vicente de Paolo. She has four male assistants under her, and nothing could exceed the neatness, cleanliness and freshness of the kitchen, scullery, and meat and provision stores, all of which are constructed on a large scale. Most of the supervision of bedding and clothing, &c., and some proportion of the nursing are undertaken by the same Sisterhood, thirty-four of whom are employed in the hospital and quartered above the kitchen and pack stores. Other buildings in the hospital enclosure are the barracks and stables of the mounted section and the barracks of the infantry section of the Army Medical Corps; and also a large three-storeyed block of quarters for the senior medical officer of the hospital, engineer officer, ond chaplain. The senior medical officer ranks as colonel, and there are two medical officers of lieutenant-colonel's rank, who form an invaliding board. The other medical officers of the hospital are 12 surgeons-major, and 4 surgeons-captain, the last being styled "*officiales de guardia*," or duty officers, who remain in hospital in rotation for 24 hours as medical officers on duty. Most of the medical officers live in Madrid and come in and out daily to the hospital. The road to the hospital from the various barracks in the city is rough and in bad repair, and the sick are at present conveyed in the ordinary ambulance wagons. It is proposed, however, to construct shortly a special electric tramway with ambulance cars, similar to those running between the barracks in Berlin and the military hospital at Tempelhof, on the lines of which the Carabanchel Hospital appears to have been modelled. The need of this tramway is great, as the transport of the sick to hospital over the present rough ground is very trying. Indeed, I was informed that already two deaths have occurred *en route*, and it may be well to specially emphasize this point, as showing the necessity of arranging beforehand that there shall be special and suitable means of sick transport from barracks to hospital, in all cases where it is contemplated to build garrison hospitals at a distance from barracks.

GENERAL NOTES.

I do not propose to add to the length of this report by notes on the barracks and various other hospitals and institutions which I visited in Madrid, but would briefly state that Spain appears at present to be in a transition state as regards hospital and barrack construction and sanitation generally, and that many vast and important reforms have recently been initiated and are at present being carried out, not only in Madrid, but throughout the kingdom. The new barracks and accessories are comfortably and well arranged, generally on the principle of separate pavilions for each company, the arrangements for cooking and meals being by battalions of four companies each. Several new and well constructed hospitals exist in Madrid, one of special interest and unique construction being the "*Instituto Rubio*," a small hospital for cases requiring treatment by surgical operations. In addition to administrative blocks, this hospital consists of two pavilions, with two 12-bed wards in each, one pavilion being for males and the other for females. Each pavilion is connected by semi-circular passages with a circular operating theatre, as in the case of the military hospital at Carabanchel, the outer walls of the theatre being of glass. The whole arrangement of the hospital, including site, structure, and equipment of wards, operating theatre, &c., forms an excellent example of the principles of asepsis in hospital construction, as adapted to a climate such as that of Madrid.

Voluntary Aid Societies.

Besides the hospitals, there are in each police district in Madrid "*Casas de Socorro*," or "Aid Stations," to which cases of street accidents, &c., are conveyed, and where immediate surgical and medical assistance is afforded. These stations are admirably equipped with small wards, operating room, means of sick transport, &c., and have surgeons and attendants on duty night and day. They form part of the Madrid Municipal Sanitary Administration (*Beneficiencia de Madrid*).

The Red Cross Society also plays an important rôle in Spain, and maintains an equipment and personnel for affording voluntary aid in time of war, as well as for collecting and administering funds for receiving and sending to their homes invalids coming from the Colonies, and for affording pecuniary help to them and their families, and to the families of those who have died on service abroad. The organisation of this society is established by royal decree, and it has a Central National Committee (*Asamblea Suprema*) in Madrid, as well as branches in all the provinces. The work of the Society has been chiefly confined recently to assisting invalids from Cuba and the Philippines. The invalids are received at the port of disembarkation, and passed on to the branch of the Society in the province of which the invalid is a native, or where his home happens to be. The following statement, issued by the sub-committee of the Province of Navarre, indicates the nature of the assistance given by its members :—

(1) Sick and wounded soldiers, on arrival at the capital of the Province (Pamplona), but who are not natives of the town, will be received at the railway stations, conveyed to inns and temporarily lodged there at the expense of the Society.

(2) Clothing, boots, &c., will be inspected and new clothing provided where necessary.

(3) Invalids, going to their homes in other parts of the province, will be provided with railway or stage coach tickets, their baggage, &c., will be collected and forwarded to places where there is no railway or stage coach service, and arrangements will be made for their board and lodging at places where, during the journey, they have to stay over night.

(4) Invalids, residing in the capital, will receive medical and surgical treatment by Medical Associates of the Society.

(5) Invalids, desirous of entering the provincial hospital for treatment are placed in the private wards at the expense of the Society.

(6) In other towns a daily money allowance and medical comforts will be issued to those whom the parish priest certifies to be in necessitous circumstances and to require such assistance, but special care will be taken to prevent abuse of this charity.

(7) Preparation and forwarding of documents and papers, &c., which will facilitate the prompt settling of the invalids' claims against the authorities and others.

The Red Cross Society in Spain, as may be gathered from the above, is working on sound practical lines, as a supplementary aid to the sick and wounded of the national army. It is interesting to note that, in time of peace, it is constantly employed in affording aid to invalids, discharged from the service, so that there is necessarily a practical organisation in existence, which can readily be adapted for supplementing the regular medical services in time of war. The members of the Society are entitled to wear a recognised official uniform of grey cloth and of a simple but smart pattern.

I took the opportunity on the way to and from Madrid of seeing some of the working of the French Army Medical Service, and a report on the new regulations regarding vaccination in the French Army is subjoined. While at Paris I was invited by M. Dujardin Beaumetz, the Director General of the French Army Medical Service, to inspect the "Docks" of the mobilisation branch of the service. The French field equipment is well known, but there is one addition to it, to which my attention was specially directed, as it has only recently been introduced and has not yet been figured or described in the "*Règlement sur le service de santé de l'armée en campagne.*" This is a folding stand for supporting the field stretcher, and enabling it to be used as an operating table in field hospitals and dressing stations. It is also intended to store a similar stand, with shorter legs and fittings for mosquito curtains, as part of the equipment for tropical expeditions, so that stretchers may be used as hospital beds. These stretcher stands are made of wood, clamped with iron, and fold into packages of 22 kilos. weight each, the package being kept together by a leather strap and buckle.

VACCINATION IN THE FRENCH ARMY.

From the 1st November, 1897, arm to arm vaccination and vaccination direct from the calf have been abolished in the French Army. Vaccination with preserved or dried lymph has also been prohibited, and in future only glycerinated pulp will be used.

This decision has necessitated a complete re-organisation of the services for the production, preparation and supply of lymph and of the methods of vaccination in the French Army; and the new regulations on the subject have been drawn up with great care and exactness.

The details contain information both valuable and interesting to officers of our own Medical Service; the dominating principle being the maintenance of aseptic conditions throughout.

The production, preparation and supply of the glycerinated pulp are duties undertaken entirely by the Army Medical Service; five so-called *vaccinogène* centres being established for the purpose, as follows :—

(1) At Paris; at the Val-de-Grâce military hospital (*L'école d'application du service de santé militaire*), for supplying lymph to the Military Government of Paris, and to the 2nd, 3rd, 4th, 5th, 9th and 10th Army Corps.

(2) At the military hospital at Chalons Camp; for the 1st, 6th, and 7th Army Corps.

(3) At Lyons, at the Desgenettes military hospital (École du service de santé militaire), for the Military Government of Lyons and the 8th, 12th, 13th and 14th Army Corps.

(4) At the military hospital at Bordeaux, for the 11th, 15th, 16th and 18th Army Corps.

(5) At Algiers, at the Dey military hospital, for the Algiers, Oran, Constantine and Tunis divisions.

Each of these *vaccinogène* centres is placed under the charge of a specially selected Army Medical Officer; the Val-de-Grâce centre being under the assistant professor of epidemiology, the Lyons centre under a surgeon-major, appointed by the director of the army medical school there, and the other centres under medical officers, appointed by the Minister of War.

In addition to the regular medical officer in charge of each centre, one of medical officers at the hospital where the centre is established must be kept thoroughly instructed in and *au courant* with the methods of maintaining and preparing the lymph so as to take over charge of the centre in case of need.

Each centre is obliged to maintain a lymph supply suitable for all the requirements of its district, the Algiers centre undertaking the supply of lymph for vaccinating the natives as well as the soldiers in Algeria and Tunisia, and in the French Colonies and protected states. No opportunity is to be neglected of renewing the sources of supply, whenever cases of cow-pox or horse-pox occur in their neighbourhood, and the medical officers in charge of each centre are to keep themselves informed as to the existence of such cases.

The establishment of each *vaccinogène* centre is extremely simple and consists of a stable, of not less than 3 stalls, and a room communicating with and adjoining it. The walls are tiled and the floor concreted with impermeable material and there are good ventilation and drainage. The fittings of the stalls enable the calves to feed freely but prevent them turning their heads so as to interfere with the vaccine pustules by licking the inoculated surface. The room adjoining the stable contains the table used for the operation of collecting the lymph from the calves; and the additional equipment, sanctioned for each centre, consists of leather straps for immobilising the calves during the collection of the lymph, muzzles, masks, and hobbles, body cloths, brushes and curry-combs, clipping machine and razors with metal handles, inoculating lancets, pincers for "expressing" the vesicles (Chambon's pattern), Volkmann spoons for collecting the pulp from the vesicles, vaccinating lancets, bistouries and scissors (all made with metal handles), tubes for the fresh pulp, tubes for the glycerinated pulp, watch glasses, bell glasses, glass rods, porcelain pestle and mortar, weights and scales, enamelled iron dishes for placing instruments in disinfecting solutions, Pasteur sterilising stove, d'Arsenval incubator with Roux regulator, blow pipe with two "Jarry" burners, two maximum thermometers, pounding machine for mixing the glycerine and pulp, and ice box.

In winter the stable is kept at a permanent temperature of 53° to 57° F.

Two men, one a non-commissioned officer, are told off exclusively for duties in connection with each *vaccinogène* centre; men accustomed to looking after cattle being selected if possible.

The supply of calves is to be obtained if possible through the butcher contracting for the supply of fresh meat to the hospital, where the *vaccinogène* centre is established: and the sum paid for the use of the calves will be determined annually by the Minister of War on a claim submitted by the medical officers in charge of the hospitals.

A military veterinary surgeon can be asked to select animals, to give advice as to their care, and to perform autopsies, when such are considered necessary. The veterinary surgeon will be appointed for this duty by the general officer commanding on application being made by the Principal Medical Officer. In towns, where the slaughter houses are under government inspection, the inspectors must give a certificate concerning any calves slaughtered after having been used for the production of lymph, stating whether they are free from contagious disease and specially noting the existence or otherwise of tuberculosis. Should any such disease exist, the lymph collected from the calf must be immediately destroyed.

The following points govern the selection of the calves, which should be heifers. Age 4 or 5 months, colour light, appearance healthy and lively, thin rather than fat, with clear bright eye, muzzle rose-coloured and fresh, supple skin, free from lumps or swellings, and coat silky and shining. Calves that are too thin, feverish, sickly looking, thick skinned, tucked up or suffering from diarrhœa are to be rejected unhesitatingly. The umbilicus is to be squeezed to see that no pus exudes from it. Under all circumstances it should be the rule to leave the calf alone and under observation for 24 hours before proceeding to inoculate it; but, on the other hand, care should be taken not to keep the animals in the stable several days in advance, as they run the risk of getting accidentally inoculated and thus incapable of giving a proper supply of lymph.

The calves selected for inoculation should be weaned; otherwise they are liable to contract diarrhœa and fever. Their food will consist daily of 4 litres of bran, 2 litres of hay, 4 kilogrammes of lucern, and 4 litres (about 1 gallon) of water (2 in the morning and 2 in the evening). In Algiers the ration is modified to suit local resources. The bedding is to be changed daily.

On arrival at the stable the calf will be cleaned with curry comb and brush and left alone for 24 hours. The temperature must, however, be taken morning and evening and should fluctuate, if normal, between 101·3° and 103·1° F. (38·5° and 39·5° C.) in the rectum. If there is diarrhœa or rise of temperature the inoculation will be postponed. Otherwise it is to be proceeded with after the 24 hours' observation.

The inoculation of the calf is carried out as follows:—

The surface of skin selected may be either the whole of one side, or the abdominal-thoracic region of both sides. The former area is marked off superiorly by a horizontal line 2½ to 3 inches distant from the spine and parallel to it; inferiorly by a line drawn antero-posteriorly passing close to the umbilicus, anteriorly by the prolongation of the axillary fold upwards and downwards, and posteriorly by a line following the inguinal fold but enclosing the teats, which are thus included in the field of inoculation. The abdominal-thoracic area has similar inferior, anterior and posterior margins, but the superior margin on both sides is a line drawn from the middle point of the axilla to the corresponding point in the inguinal fold. This region is preferable as the skin is thinner and finer, and more suitable for the development of vesicles and collection of lymph.

Before proceeding to inoculate, the calf is hobbled and the head chain shortened to prevent the calf turning its head, and the operation is carried out while the calf is standing. The field of inoculation is first clipped with the clipper. The surface is then to be thoroughly washed with hot water and soap and shaved with great care so as to avoid causing any abrasion of the surface. The whole area is then washed with tepid water, previously boiled, and dried with a cloth. A series of scarifications are then to be made with the lancet. Each scarification will be about ¾ inch long, at right angles to the axis of the animal's body, and about 1 inch distant from one another. The scarifications should be made in lines from before backwards, each line containing about 12 to 15 scarifications. Altogether about 200 scarifications should be possible over the whole field of inoculation, *i.e.*, there would be about 16 to 18 lines of scarifications. The vaccine material is inserted into the scarifications by means of a sterilized pipette charged with either recent lymph or with glycerinated pulp, at least one month old, glycerinated pulp of more recent preparation always causing inflammatory symptoms. The lymph or pulp is deposited along the whole length of each scarification by means of the pipette.

The calf is then left quiet, without muzzle or collar, the arrangement of head chain sliding on a vertical bar enabling it to feed without its being able to touch the area of inoculation with its mouth.

During the development of the vesicles the calf is to be very carefully watched, and rise of temperature or onset of diarrhœa specially noted. A temperature in the rectum exceeding 103·6° F. (39·8° C.) is to be considered suspicious and the lymph from the vesicles will not be collected. If diarrhœa occurs, the food is to be reduced in quantity or entirely stopped and 3 or 4 eggs given instead. At the same time some bismuth subnitrate and a few drops of laudanum in milk will be given. Severe or fœtid diarrhœa, which does not yield to these measures, or any other symptom o serious illness, will be a cause of rejection of the lymph and of the removal of the calf from the stable.

The vaccine pulp is collected from the calves in the following manner, the 5th or 6th day after inoculation being selected for the operation.

All the instruments to be used are first to be sterilised by boiling in a saturated solution of borax (to prevent rusting). The field of the inoculations is then soaped all over and the surface round each vesicle again carefully shaved. The skin is finally douched with tepid or cold water, previously boiled, and dried by swabbing with towels, friction being avoided. The necessity of avoiding friction is emphasised, as its immediate effect is the removal of the superficial crusts leaving a bleeding surface, on which hard clots form that interfere with the collection of the pulp. When everything is ready, the operator places by his side a towel and watch glass, and has ready for use a Chambon's pincers, lancet and Volkmann's spoon. The pustule is seized by means of the pincers, fixed well below the base so as to completely press the pustule outwards, the superficial crust is removed with the lancet and placed on the towel; and, then, with the Volkmann's spoon the surface of the pustule is scraped several times until finally by a free use of the cutting edge the pulp drops into the cavity of the spoon. The pulp thus collected is placed in the watch glass, which has been previously sterilised by heating over a flame and allowed to cool and which is protected from dust or dirt during the collection of the lymph by a glass cover (*cristallisoir*). Each pustule is dealt with, one after the other, in the same way, the whole operation of collecting the pulp occupying a considerable time.

When all the pulp has been collected it is emptied into a beaker of known weight and weighed.

A quantity of glycerine equal to one-third the weight of the pulp is then sterilized and a portion of it sufficient just to cover the surface of the pulp added to the beaker. The beaker is then placed in the icebox for 3 or 4 days.

After this period the operation of cleaning the pulp and mixing it with the remainder of the glycerine takes place. This requires much delicacy of manipulation and occupies a long time, from 3 to 4 hours being required for the preparation of 12 to 15 grammes of pulp, the average quantity collected from each calf. The operation is conducted in the following way. The contents of the beaker are emptied into the mortar, previously sterilized by heating over a flame, cooled and kept under a bell glass. A minute cleaning of the pulp is then made, all hairs and blood clots being removed by means of a hook-shaped pipette. The glycerine is then added gradually and pounded up with the pulp, until a homogeneous pulp, free from clots is formed.

Occasionally a metal sieve, previously sterilized, may be used, if the cleaning is not judged satisfactory, but this should rarely be required. As a substitute for the pestle and mortar method of mixing the pulp and glycerine, pounding machines may be used, but all the parts must be sterilized by boiling for a quarter of an hour before the machine is used, and immediately after use the machine is to be taken to pieces again and carefully cleaned.*

When the glycerinated pulp is thus thoroughly cleaned and prepared it is placed in tubes for issue to medical officers for vaccination purposes. Three kinds of tubes are kept at each vaccination centre; the largest size contains 1 gramme of pulp and the medium size, ½ gramme; while the smallest are capillary tubes of 2 millimètres diameter capable of containing ufficient lymph for vaccinating 10 or 20 men.

The tubes are filled with the glycerinated pulp by means of a sterilized pipette, and the two larger sizes corked, the cork being lightly charred and dipped in melted paraffin, which is allowed to dry before the cork is inserted.

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* One of these machines is used at the Val-de-Grâce centre. It is of a pattern invented by Dr. Chalybœus, and is made by Edmund Gsehering of Dresden, the price being 205 francs in Paris.

This coating of paraffin helps to solder the cork to the inner surface of the tube, and the tube is further hermetically sealed by again dipping the corked end into melted paraffin. The capillary tubes are sealed in a flame in the usual manner. Each tube is then labelled, the label stating the *vaccinogène* centre and the date of the collection of the lymph from the calf. The tubes are then kept in the ice-box till time of issue.

The general organization for ensuring thorough protection by vaccination and re-vaccination in the French Army is as follows :—

All medical officers in charge of troops, schools, convalescent depôts, military prisons and penitentiaries, and public works departments are responsible :—

(1) For vaccinating or re-vaccinating all young soldiers or pupils on joining the corps or schools.

(2) For renewing the operation on all those who joined with the previous contingent, but were unsuccessfully vaccinated.

This secondary operation must be performed during the year but not sooner than two months after the first operation.

(3) For vaccinating or re-vaccinating all the men of the reserve, territorial army or others liable to service on being called out for their periods of training with the exception of those whose small books (*livret*) show that vaccination or re-vaccination was successfully performed during the previous 8 years, or who produce a certificate by a doctor of medicine, legally stamped, stating that they were successfully vaccinated on a given date, which must be within the previous 8 years.

(4) For re-vaccinating during an epidemic of small-pox all men whose previous vaccination was unsuccessful.

Medical officers in charge of hospitals are under the same obligations with regard to patients in hospital who have not been successfully vaccinated or re-vaccinated while with their regiments.

The method of vaccination is laid down in minute detail, the tubes of lymph being kept in a cool place away from the light until required for use.

The men to be vaccinated are to have their arms carefully washed under supervision of a non-commissioned officer, and dried with sterilized compresses supplied from the regimental detention ward (*infirmerie*). The use of any antiseptic solution is strictly prohibited in cleansing the seat of operation.

The site selected is to be invariably the V-shaped groove formed by the insertion of the deltoid muscle. This groove is chosen as the vesicles are more protected from pressure and friction by the sleeve there than elsewhere. Three inoculations are to be made in each arm. They may be placed one at the apex of the V, the second in the groove along the anterior margin of the deltoid, and the third in the groove along the posterior margin, or all three may be placed in the posterior groove. The inoculations are to be 1 to 1½ inches distant from one another.

Before operating the pulp is emptied from the tube into a watch glass, previously sterilized in a flame and allowed to cool.

A vaccination lancet is to be used or preferably the "vaccinostyle" pen, recommended by Dr. Mareschal (*médecin-principal de 2nde classe*). The instruments are to be previously sterilized by heating in a spirit flame or by boiling, no antiseptic solution being permissible. At the Val-de-Grâce centre where the Mareschal vaccinostyle is used, the "pens," 50 or 100 at a time, are boiled in a solution of borax, and a separate one used for each inoculation. They must be allowed to cool before being used.

The operation is performed as follows :—

The arm is held with the left hand and the skin directly below the point where the inoculation is to be made is drawn down with the thumb and stretched. Then with the vaccinostyle in the right hand and charged with glycerinated pulp, a puncture is made obliquely into the thickness of the epidermis, taking care not to enter the subcutaneous tissue. Then without withdrawing the point, the skin is gently relaxed. This creates a vacuum and the vaccine pulp is aspirated into the tissue. The point is then withdrawn.

All scarifications or abrasions are strictly prohibited, the method by

APPENDIX No. VI.

SUMMARY OF OPERATIONS ON THE NORTH-WEST FRONTIER OF INDIA, FROM 19TH JUNE, 1897, TO 6TH APRIL, 1898.

By Surgeon-General A. A. GORE, M.D., Principal Medical Officer, Her Majesty's Forces in India.

Since the return of the Chitral expedition there had been peace on the North-West Frontier, and it appeared probable that for some time there would be no further disturbances amongst the turbulent tribesmen inhabiting these mountainous regions. The attack on Mr. Gee's escort at Maizar in the Tochi Valley in June, 1897, quickly dispelled this idea, and from there to the Malakand, from the Malakand to Shabkadar, from the latter to the Khyber, and from the Khyber to Kohat, the Kurram Valley, and the Samana range of outposts, the tribes in succession were up in arms, and the state of unrest extended for more than five hundred miles of frontier. Troops were pushed to the front with unparalleled despatch, and there was quickly in line the finest force ever sent to meet an enemy and large enough for any emergency. Those only who were in a position to understand what the organisation, equipment, transport and supply of such an army meant in countries where, in the main, only pack transport could be used, could appreciate the work which had to be, and was, done so efficiently.

The forces organised during the operations were the Tochi Valley Field Force, the Kohat-Kurram Field Force (including the force engaged in the operations on the Samana), the Malakand, Mohmund, and Buner Field Forces, and the Tirah Expeditionary Force. The units mobilised were: 9 regiments of Cavalry, 16 batteries of Artillery, 10 companies of Sappers and Miners, and 59 battalions of Infantry, the average strength of the combined forces during the period of the operations being

British officers, non-commissioned officers and men	18,688
Native " " " "	41,677
Followers	32,696
Total	93,061

Thirty-six field hospitals were mobilised (14 British and 22 Native), giving a total of 3,600 beds, and in rear of the various spheres of operations there were 3,125 beds distributed in base general hospitals at Bunnu (200 beds), Kohat (250 beds), Rawal Pindi (1,250 beds), and Nowshera (1,250 beds), and in rest depôt hospitals at Peshawar (50 beds), Golra Junction (25 beds), and Khushalgarh (100 beds), thus making a total hospital accommodation, including field hospitals, of 6,725 beds.

The various corps units had the following medical personnel, equipment and transport:—

Medical officers	62
Assistant-surgeons and hospital assistants	62
Ward orderlies and ward servants....	88
Tents, general service, 80 lbs.	88
Field dandies....	150
Field stretchers	274
Bearers	900

Pack mules	254
Field medical panniers, pairs	88
Field medical companions, field service haversacks, etc.	264

and the field hospitals' and bearer companies' personnel, equipment, etc., consisted of—

Medical and hospital personnel	9,658
Animals	4,180
Field dandies	720
Ambulance tongas	720
Tents, general service, 160, 80, 45, and 40 lbs.	1,394
Total weight of equipment, exclusive of tongas, in *maunds*	7,790

The composition of the various forces mobilised was as follows :—

Name of Field Force, and period of operations.	British officers.	British troops.	Native troops.	Followers.	Total.
Tochi Valley Field Force, from 10th June, 1897, to 18th February, 1898.	143	709	5,165	3,902	9,919
Kohat-Kurram Field Force, including the troops engaged in the operations on the Samana Range, up to the 15th October, when it merged into the Kurram Movable Column.	244	2,333	8,602	9,159	20,338
Malakand Field Force, from 26th July, 1897, to 21st January, 1898.	217	2,494	4,979	2,940	10,630
Mohmund Field Force, from 3rd September to 6th October, 1897.	112	1,174	3,541	1,547	6,374
Buner Field Force, from 1st January to 4th February, 1898.	176	2,131	3,170	3,219	8,696
Tirah Expeditionary Force, from 9th October, 1897, to 8th April, 1898.	689	8,266	16,220	11,929	37,104
Totals	1,581	17,107	41,677	32,696	93,061

For these several expeditions a very large transport was required, which consisted of the following :—

Field Force.	Camels and bullocks.	Other pack animals.
Tochi	4,200	2,300
Kurram Valley	2,390	280
Kohat Garrison	750	180
Malakand	8,320	2,950
Peshawar Column	980	3,200
„ Garrison	790	500
Tirah main column	13,370	29,440
Reserve Brigade	670	460
„ animals..	3,000	3,000
Totals	29,470	42,310

This large number of transport animals required the presence with the various forces of numerous attendants, who had to be cared for when ill by the medical officers and their subordinates, and for whom in older times special hospitals had been allowed.

Of the tribes who were quickly to feel the power of the Government of India, the Karlanis, of whom the Afridi Afghans were but a sub-tribe, consisted of sub-divisions of the Utman-Khel (located between the Swat and the Mohmund country); the Shinwaris, located in the mountains west of the Khyber, some in the Kunar Valley north of the Kabul river; the Khogianis, who adjoined them on the west, the Wurukzis or Urakzis, who were located in the difficult mountain tracts of Tirah, the Khyber and Jellalabad; the Mangalis, Jzadrans, Shitaks and other minor Bangash sub-tribes of Karlanis, located round Kohat and adjoining it, as far as the Indus and further north and west into the Kurram Valley; and some others of lesser note and strength besides the Khataks and Dilaziks in the Peshawar district, and lastly the Waziris, the Mahsud and Darwesh Khel, and their ramifications. The other side of "the Karakar Pass" had as yet been unvisited by Europeans. It was on the way through this defile that Akbar's general, Birbar, when he retreated from Swat through the Buner country towards Attock, lost his army and his own life.

The Utman-Khel were supposed to muster 10,000 fighting men; the Mohmunds were also a powerful tribe; the Warukzis 20,000; the Shinwaris some 12,000; the Shitaks and other Bangash branches located further west than these as far as the Kurmak Valley and adjoining, 100,000 families. Allowing one fighting man to every two families, they could furnish a formidable number. The total strength of the eight clans of the Afridis was calculated at 26,000 to 27,000 combatants, and the Urakzis about the same number. Tirah, hitherto a *terra incognita*, was regarded as the headquarters of their forces. In 1878 two expeditions had entered the Bazar Valley, but neither was strong enough to essay the Raigal or Maidan. As to character, most of these tribes bore the worst possible. Paget and Mason wrote, of the most powerful of them, that they were "ruthless, cold-blooded, treacherous." Against the Afridi Afghans more punitive expeditions had been undertaken since the annexation of the Punjab than against any other, and, between 1849 and 1863, along the frontier no less than fifteen expeditions were undertaken, commanded by some of the most distinguished soldiers of the Indian Army. In some of these expeditions we had been pretty roughly handled, as at Umbeylah and in the first Black Mountain Expedition, where we lost heavily in killed and wounded. The total loss on our side in the first had been 908, including 15 British officers killed and 21 wounded, while the loss of the enemy was estimated at 3,000.

The old *jezail* had now given place to arms of precision, in the hands of men trained as marksmen from their early youth, and this fact required special consideration in arranging the medical details of the various forces. Hospital provision had also to be made for troops operating from the malarious and hot valleys of the Tochi and Swat to frigid mountain regions where diseases of quite a different nature were to be anticipated. As might have been expected, these conditions, as they prevailed the one over the other, influenced the medical history of the different field forces.

Upon receipt of the news of the treacherous attack upon the Political Officer's escort at Maizar, the Government of India resolved immediately upon a punitive expedition into the Tochi Valley, of such a strength as would not invite attack and would give confidence to any clans who might be hesitating whether they would join the malcontents in the upper end of the valley. In less than a week orders were issued to mobilise two brigades of infantry, including two British battalions, namely, the 2nd Battalion Argyll and Sutherland Highlanders and the 3rd Battalion Rifle Brigade, with their hospitals and medical personnel, and they were well on their way by the end of June. Every precaution was taken to protect the European regiments on their march from Khushalgarh to Bunnu *viâ* Kohat (110 miles), and two sections of a British field hospital with ambulance carriage accompanied each battalion. Standing camps of E. P. Indian pattern general service tents and a supply of ice and water were provided at each of the halting places. The intense heat at this most trying period of the year (3rd to 14th July) proved very exhausting, and there were several cases of heatstroke, but only two succumbed. The Highlanders had to leave a considerable number of footsore men behind at Bunnu, and also others more or less prostrated by the high temperature.

They all, however, quickly recovered under a short rest and treatment, rejoining their regiments on the march onwards, and on the 19th July the two British battalions had only 38 sick out of a total of 1,559.

After two months' sojourn in this very malarious valley, with its generally impure water supply, and without the stimulating excitement of active warfare, fevers, dysentery, and diarrhœa became very prevalent, more especially in the Rifle Brigade and two native battalions who were withdrawn later. The Highlanders stood the climate much better, and on the 8th November had 564 effective out of the total of 774 recorded on the 19th July, had had comparatively few deaths, and marched into Bunnu on their return to India, 20th January, 1898, 650 strong. With the advent of the cold weather the health of the troops had improved, and on the breaking up of the force the following results were shown :—

Average strength of troops and followers	9,919
Number of deaths	297
Percentage of deaths to strength	2·99

The brigades for service in the Tochi had hardly reached their destination when, on the night of the 26th July, the camp at the Malakand was fiercely and suddenly attacked and was gallantly defended, and after a few days' desperate fighting the enemy was in full retreat, severely punished. In the short struggle we lost 23 killed and 150 wounded. On 30th July, three days after the news of the attempt to force the position had reached head-quarters, orders were given to mobilise the "field force," and it was encamped in the cooler climate of Amandara by the 10th August. The whole valley of the Swat was then beautifully green, and looked highly picturesque, the river being in full flood and split up into many channels. The troops were in the best spirits and anxious for the further advance. The medical and surgical records of its after campaigning, in all varieties of climate and bivouacking a good deal, were briefly—

Average strength of troops and followers	10,630
Number of deaths	230
Percentage of deaths to strength	2·16

The principal diseases and injuries in this field force were :—

Diseases, etc.	Admissions to hospital.	Deaths in hospital.
Fevers	2,544	23
Dysentery..	983	13
Diarrhœa	747	—
Chest affections..	275	32
Venereal diseases	186	—
Debility	161	1
Rheumatism, etc.	106	—
Heat stroke	78	5
Hepatic diseases	28	2
Scurvy	9	—
Alcoholism	1	—
Gunshot wounds	1,188	28

The Mohmunds having attacked the old Sikh fort of Shabkadar, beyond Peshawar, and being repulsed with heavy loss, the "Mohmund Field Force" came into existence on the 3rd September, 1897, and continued its operations in a country which was particularly trying for troops at that time of the year, owing to the heat and glare from the sand and rocks, and the severe kotals that were constantly met with. The country was also arid and sparsely cultivated, with little water and nothing in the way of supplies to be procured on the line of march. Its operations came to an end with the complete submission of the tribes on the 6th October.

Average strength of troops and followers	6,374
Admissions to hospital	1,180
Deaths	6
Percentage of deaths to strength	·09

Towards the end of October, in view of the increasing unhealthiness of the Swat Valley, the forces in the field there were distributed between the stations of Maidan, Jalala, Dargai, Malakand, and Chakdara, with the base at Nowshera. The general health of the troops was good, and the transport in a very satisfactory state. The following were the health statistics on 1st November :—

	Strength.	Sick.
Europeans	2,469	175
Native troops	6,061	85
Total	8,530	260

The percentage of sick to strength was 3·05. The following statistics show the condition of the battalions of European infantry with the force on the same date :—

Battalions.	Strength.	Sick.
1st East Kent Regiment	581	13
1st Royal West Kent Regiment	687	24
2nd Highland Light Infantry..	713	73

In December heavy rain fell at intervals, but the weather was fine and cold, and the troops were reported to be "in good form and health."

On the 23rd December a communication was sent to the Bunerwals and Chamlawals that if they did not at once comply with the terms of the Government of India, a punitive expedition would shortly be sent against them for their complicity in the recent disturbances in Swat, and two brigades were concentrated with their field hospitals and medical personnel at Koonda, on the borders of the Swat Canal. The tribes not complying, the troops were quickly launched against them, concentrating at Sanghoo on the 6th January, 1898. The Tanga Pass was reconnoitred on the 7th; the peaks above were in the hands of the troops shortly afterwards, and the force advanced to the well cultivated plains beyond, the men and followers being in excellent spirits. During this short campaign (1st January to 6th February) the following were the medical statistics :—

Average strength of troops and followers	8,696
Admissions to hospital	340
Deaths	6
Percentage of admissions to strength	3·9
" deaths "	·07

The Tirah Expeditionary Force consisted of the following troops :—

	British officers.	British troops.	Native troops.	Followers.	Total.
Average strength ..	689	8,266	16,220	11,929	37,104

The following table gives the admissions and deaths by diseases and injuries :—

TIRAH EXPEDITIONARY FORCE.

Diseases, etc.	British officers.		British troops.		Native troops.		Followers.		Grand total.		Ratio per 1,000 of strength.	
	A	D	A	D	A	D	A	D	A	D	A	D
Enteric fever	30	6	221	56	6	1	1	1	258	64	6·0	1·72
Ague	85	—	2,765	4	2,321	15	1,539	80	6,710	99	180·8	2·67
Other fevers	36	—	248	5	165	13	102	16	551	34	14·9	·91
Dysentery	38	—	483	23	1,431	30	1,950	311	3,902	364	105·2	9·81
Diarrhœa	30	—	504	4	365	8	393	84	1,292	96	34·8	2·59
Venereal diseases ...	2	—	541	—	235	—	287	—	1,065	—	28·7	—
Scurvy	2	—	—	—	42	—	23	—	67	—	1·8	—
Debility	3	—	141	2	315	3	344	29	803	34	21·6	·91
Rheumatism	3	—	231	—	205	—	258	7	697	7	18·8	·19
Bronchitis	8	—	222	2	432	9	576	53	1,238	64	33·4	1·72
Pneumonia	1	—	50	9	189	50	276	129	516	188	13·9	5·05
Gunshot wounds ...	51	3	364	34	437	41	96	21	948	99	25·6	2·67
Other complaints ...	92	3	1,199	18	1,496	21	1,405	57	4,192	99	113·0	2·67
Total	381	12	6,969	157	7,639	191	7,250	788	22,239	1,148	599·4	30·91

The following is a statement of the principal diseases admitted into the field and general hospitals in order of frequency of occurrence :—

	Admitted.	Died.	Percentage of deaths to admissions.
Fevers	7,519	197	2·62
Dysentery	3,902	364	9·33
Respiratory diseases	1,965	293	14·91
Diarrhœa	1,292	96	7·43
Venereal diseases	1,065	—	—
Anæmia and debility	901	36	3·99
Rheumatism	697	7	1·00
Hepatic diseases	451	13	2·88
Skin „	437	2	·46
Eye „	167	—	—
Diseases of organs of locomotion	108	—	—
„ nervous system	96	10	10·42
Scurvy	67	—	—
Ear diseases	36	—	—
Diseases of the circulatory system	35	4	11·43
Erysipelas	10	1	10·00
Sunstroke and heat apoplexy..	9	1	11·11
Alcoholism and delirium tremens	4	2	50·00
Cholera..	—	—	—
Pyæmia	—	—	—
Other diseases	2,530	23	·91
Gunshot wounds	948	99	10·44
Total..	22,239	1,148	5·16

The diseases included under fevers were the following :—

	Admitted.	Died.
Small-pox	2	—
Other eruptive fevers	7	—
Simple continued fevers	76	—
Enteric fever	258	61
Ague	6,710	99
Remittent fever	462	32
*Total	7,515	195

* Four admissions and two deaths do not appear to be accounted for by the Principal Medical Officer.

There were only 7 admissions for *eruptive fevers* among the British, and the only 2 cases of *small-pox* which occurred were among the Native troops. Of the 76 cases of *simple continued fever* 69 occurred among the Europeans, as did also 251 out of the 258 cases of *enteric fever*. The percentage of admissions to strength for the last-named disease, among Europeans only, was 4·3 for officers and 2·6 for non-commissioned officers and men, with mortality equal to ·87 and ·68 per cent. respectively, the percentage of mortality to attack among British officers, non-commissioned officers and men being 24·7, as compared with 27·1 among the troops serving in cantonments during 1897. *Malarial fevers* caused 7,172 admissions and 131 deaths, of which 3,019 cases, with only 7 deaths, occurred amongst Europeans. Of the 460 deaths recorded for *dysentery and diarrhœa*, 27 occurred among Europeans, 38 among the Native troops, and 395 among the followers. For the diseases included under the *respiratory group*, the following admissions and deaths are recorded :—

	Admitted.	Died.
Tubercle of lung and phthisis	50	9
Bronchitis and bronchial catarrh	1,238	88
Pneumonia	516	188
Other respiratory affections	161	8
Total	1,965	293

Pneumonia affected chiefly the followers, 276 of the admissions and 129 of the deaths occurring amongst them. The cases of *venereal affections** were admitted in the earlier stages of the campaign, the Europeans accounting for 5·1 per cent. of the admissions, or 6·1 per cent. of the average strength, the Native troops giving 22 per cent. of the admissions (1·4 per cent. of strength), and the followers 27 per cent. of the admissions (2·4 per cent. of strength). The cases of *anæmia and debility* are classified as follows :— Europeans 161, Native troops 364, followers 376. The 7 deaths from *rheumatism* were all among followers, but of 451 admissions for *hepatic affections* only 77 occurred among them. *Skin affections* were least prevalent among the British troops, and the followers suffered most. The majority of the 167 admissions for *ophthalmic affections* were caused by mild cases of conjunctivitis. The deaths from *diseases of the nervous system* were mostly due to meningitis. *Scurvy* of a mild type caused 67 admissions, all but 2 occurring among Natives. Among 35 admissions for *diseases of the circulatory system*, with 4 deaths, there were 11 for diseases of the heart, with 2 deaths. Of the 10 admissions for *erysipelas*, 4 occurred among Europeans, and no other cases of septic origin are recorded. It is noted that in 181 days there were only 4 admissions due to drink. *Heatstroke* caused only 9 admissions and 1 death, all amongst Europeans. The number of admissions for *blistered feet* amongst the European troops was 22, and there were also 4 admissions for *flat foot* amongst them. 948 cases of *gunshot wound* were admitted into the field and general hospitals, and 99, or 10·44 per cent., died. Of these only 10 died in the base general hospitals out of 654 admissions, or a mortality of only 1·53 per cent. Many of the cases admitted to the field hospitals were mortally wounded, with no prospect of recovery. The Principal Medical Officer states that the result of the treatment in the base general hospitals was the best ever recorded, as pyæmia, hospital gangrene, and all wound diseases were conspicuous by their absence. From the Tirah Maidan the wounded had to be transported 112 miles before they could be entrained, the 40 miles to Shinowrie being traversed in field dandies and the remaining 72 miles or more to Khushalgarh in ambulance bullock tongas. Two high mountain passes, steep and difficult, had to be crossed. The last stage of the journey to the base hospitals at Rawal Pindi and Nowshera was accomplished by railin ambulance carriages, the distance being 74 and 152 miles respectively.

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* A rigid medical inspection for venereal disease revealed 769 cases among the 21,683 European troops who proceeded on service in 1897-8, and 494 broke down during the campaign from these diseases.

Regions of the body wounded.

Head	33
Face and neck	37
Chest	72
Abdomen	55
Neck and spine	35
Perineum, groin, buttocks	42
Shoulder	37
Upper extremities	147
Hip joint	6
Lower extremities	292
Arteries	3
Parts not defined	189

As in all previous campaigns some battalions suffered disproportionately to others. In the early part of 1898 the 2nd Battalion 2nd Gurkhas, owing to the severe weather at Fort Lockhart, suffered from bronchitis a good deal. But as a rule the result of exposure to cold and wet and heavy duties, often without tents, predisposed to ague and diarrhœa, when these had been latent, rather than to chest affections and rheumatism. The 1st Royal Scots Fusiliers and 15th Sikhs, who had suffered much from malaria contracted in the Kurram Valley in 1897, and the 1st Devonshire Regiment after a tour of previous service in the malarious valley of Peshawar, became ineffective from malarial fever chiefly.

The following table compares the statistics of admissions and deaths amongst the European troops in this Expeditionary Force with the admissions and deaths in a European army operating in Bengal in 1858 :—

Diseases, etc.	New army in the field, Bengal, Mutiny Year, 1858. Ratio per 1,000 of strength.* Admissions.	New army in the field, Bengal, Mutiny Year, 1858. Ratio per 1,000 of strength.* Deaths.	Young soldiers in the field, Tirah Expeditionary Force, 1897–8. Ratio per 1,000 of strength.* Admissions.	Young soldiers in the field, Tirah Expeditionary Force, 1897–8. Ratio per 1,000 of strength.* Deaths.
Cholera	5·0	3·00	—	—
Fevers	1333·3	18·57	392·4	7·86
Heat apoplexy	55·8	17·17	·7	·12
Delirium tremens	6·2	·64	·5	·24
Dysentery	231·7	33·67	58·4	2·78
Diarrhœa	303·5	—	60·9	·48
Hepatic diseases	69·0	5·84	16·0	·48
Phthisis	6·0	2·19	·6	·12
Respiratory diseases	92·3	2·42	34·4	1·33
Venereal "	270·6	—	65·4	—
All other causes	725·0	5·92	214·7	5·58
All causes	3098·4	89·42	843·9	18·99

The number of deaths amongst the followers, as will be seen from the table given on a preceding page, was excessive as compared with British and native troops. In the earlier expeditions the followers were better selected; but in the Tirah expedition a large proportion had been drawn from the famine districts of the North-West Provinces and Oudh, the Punjab and Madras, and they were as a rule the dregs of the population of the larger cities, many being either too young or too old. As compared with Native troops the principal diseases from which they suffered were

Diseases.	Native troops. Admitted.	Native troops. Died.	Native troops. Percentage of deaths to admissions.	Followers. Admitted.	Followers. Died.	Followers. Percentage of deaths to admissions.
Fevers	2,492	29	1·16	1,612	97	5·90
Dysentery and diarrhœa	1,796	38	2·12	2,343	395	16·81
Respiratory affections	656	61	9·30	892	192	21·52
Anæmia and debility	364	5	1·37	376	20	5·31

and the ratios of admissions and deaths for diseases alone (*i.e.*, excluding gunshot injuries) were—

	Ratio per 1,000 strength. Admitted.	Ratio per 1,000 strength. Died.
Native troops	444 0	9·25
Followers	509·7	64·30

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* The Principal Medical Officer does not state the sources of information nor whether these ratios are reduced to a common annual standard.

General Summary of the several Field Forces.

Total admissions from all causes	41,055
Total deaths	1,632
Ratio per 1,000 of admissions to strength	440·6
„ „ deaths „	17·54

Between the 28th June and 27th December, 1897, the following were the percentages of sick amongst the British and Native troops in the field:—

Name of Field Force.	Average percentage daily sick, excluding followers.
Tochi Valley	9·08
Kohat-Kurram	1·52
Malakand	2·16
Mohmund	2·50
1st and 2nd Divisions, Tirah Expeditionary Force.	3·25
Kurram movable column	3·14
Peshawar column	3·14
Line of communication troops	5·14
Reserve brigade	5·30
Peshawar and vicinity	10·52

Total deaths from disease alone.

Field Forces.	British officers.	Indian officers.	British soldiers.	Native troops.		Total.
				Commissioned officers.	Non-commissioned officers.	
Tochi	2	1	127	2	61	193
Malakand	—	—	16	—	29	45
Kohat-Kurram	—	1	6	—	5	12
Mohmund	—	—	1	—	2	3
Tirah	7	2	121	2	148	280
Buner	—	—	—	—	3	3
Total...	9	4	271	4	248	536

SANITARY AND OTHER NOTES.

Very great attention was paid by the medical officers to the sanitary state of the various posts and camps, and, as a rule, their condition was remarkably good. The weekly sanitary inspections were very carefully made, and especially with a view to the detection of incipient scurvy, which was entirely absent from the British troops, and the few cases which occurred amongst the Native troops and followers were of a mild type. Quinine was used as a prophylactic when considered desirable. The rations as a rule were of excellent quality, and the clothing very good and suitable to the varying conditions of climate. The water supplies were safeguarded as far as practicable and purified as far as possible.

The sick transport consisted of ambulance trains of the usual converted pattern on the railways, the sick and wounded as they arrived being placed in the carriages without being removed from their field dandies, which were arranged in two rows, the lower on the floor of the carriage, the upper slung to the permanent fittings. On the march the sick and wounded were conveyed in dandies, camel kajawahs, ambulance tongas, or on riding mules or ponies fitted with the convertible ambulance saddles. The arrangements were, on the whole, well conducted, and the sick and wounded had every comfort.

The field hospital camps were well arranged, and, considering the vicissitudes of the marches, the tents and equipment were, at the termination of the campaign, in very good condition. The field hospitals were arranged as

(*a*) mobile hospitals with fighting units,
(*b*) stationary hospitals on lines of communication,
(*c*) for conveyance of sick from the front to base,
(*d*) accompanying troops on the march to and from the front.

The native field hospitals have now the additional duty thrown upon them of treating followers. As there were 32,696 followers to 60,365 combatants, the meaning of this can be easily understood. It may be noted that the field hospitals of the army in India have a much more arduous duty imposed upon them than those of an army operating in countries protected by the Geneva Convention, as the latter, when filled with sick or wounded, may be allowed to remain on the retreat of a force or when temporarily isolated, without interference by the enemy, while the former have either to be carried with the troops or cease to exist. Without proper transport, their movements are greatly hampered and losses of stores occur, perhaps on the eve of an action, when it is of vital importance that those with the fighting divisions should have with them all that is necessary for the immediate treatment of the wounded. This occurred more than once when unsuitable animals or an unsuitable class of bearers were supplied. The whole question of transport, ordinary and ambulance, is now being carefully considered by a special committee appointed by the Government of India. Indeed, the field hospitals, (the largest number ever hitherto mobilised in India), in the several expeditions, were put to the severest trial. Many instances of this are upon record. They did for the sick and wounded all that they could be legitimately called upon to perform, and not a single case could be authenticated in which the soldier was not well cared for when in their custody. The Principal Medical Officer of the Kurram-Kohat Field Force writes under this head : "The working of the "field hospitals was excellent. The work at many places was very heavy, "but the sick and wounded were invariably comfortably placed in tents "and very well attended to." The Principal Medical Officer of the Tochi Field Force also alludes to the working of the department as having been very satisfactory and carried on under great difficulties, and the establishments of the hospitals ample. Of these of the Malakand Field Force the General Officer Commanding writes : "The hospitals in the field were most "ably worked, and I cannot speak too highly of the services of all the "medical officers of the force." The Principal Medical Officer of the Tirah Expeditionary Force reports that "the field hospitals throughout the "expedition worked excellently, and bore well the strains which were at "times experienced from large numbers of sick and wounded being "suddenly poured into them." Here from start to finish they were constantly under fire, as also happened frequently during the Malakand and Mohmund operations. The Principal Medical Officer of these Field Forces writes : "There was an ample supply of medical comforts kept up both with "the field hospitals and with the Commissariat Department," and this remark was applicable generally.

The admirable work performed by the base general hospitals is shown in the excellent results obtained in the treatment of diseases and wounds, and in the entire absence of all septic affections.

The field medical depôts were always in advance with their respective divisions, and performed their particular *rôle* equally well.

The practical lessons of the campaigns are now being specially considered, with the view of making such further improvements in field medical organisation as may be deemed advisable ; and it is remarked, in conclusion, that the medical personnel, both officers and subordinates, added one more to the many honourable records of good work performed during their long association with Her Majesty's Army in India.

APPENDIX No. VII.

REPORT ON THE SURGICAL HISTORY OF THE TIRAH EXPEDITIONARY FORCE, 1897-98.

By Lieutenant-Colonel H. R. WHITEHEAD, F.R.C.S. Eng., Royal Army Medical Corps.

This campaign presents many points of interest from a surgical point of view. Among these may be mentioned the following:—

The nature of the ground over which the military operations took place, which from its hilly character caused difficulties in the transport of the wounded.

The different kinds of rifles and guns used by the enemy and the peculiar wounds caused by each variety.

The length of the lines of communication and their influence on the wounded.

The extreme variations in temperature.

The Base Hospital was in the first instance established at Rawal Pindi, a second at Kohat, and a third at Nowshera. From the Tirah Maidan, the ultimate object of the first phase of the expedition, to the Base Hospital at Rawal Pindi, the distance was as follows:—From Maidan to Shinowrie was nearly 40 miles; from Shinowrie to Kohat between 40 and 50 miles; and from Kohat to Khushalgarh 32 miles. At Khushalgarh the train was obtained to Rawal Pindi. In the military operations, therefore, around Maidan, the wounded had to be transported over a hundred miles before they could be entrained, 40 miles of which were performed by dhoolie and the remaining 60 miles odd by bullock tongas. The road from Maidan to Shinowrie, though ultimately good, was at first very rough, being only a track, and in its course leading over two high passes, viz., the Sampagha and Arhanga, which were at first both steep and difficult. When one considers that every wounded man had to undergo this journey, it is evident that the surgery had to be especially undertaken with this idea.

On the continent of Europe the wounded can usually either be placed in buildings close at hand, with a certainty of safety if by any chance they fall into the enemy's hands, or are taken at once by train to one of the large cities where all the resources of civilisation are at their command, and where no further move will be necessary. In the campaigns undertaken on our Indian Frontier, long distances over a bad country, and that soon after the reception of the wound, have to be traversed. It naturally follows that conservative surgery cannot be so largely practised as on the continent, and that many limbs have to be sacrificed that under better conditions might have been spared, and that the ultimate results of injuries are not so perfect as they might otherwise have been. The surgeon in making up his mind to adopt a certain form of treatment is bound to ask himself what the patient must necessarily undergo before he reaches a permanent hospital where he can remain at rest for a period of time required for the full cure of his wound.

It must be borne in mind that, even with all the difficulties of transport, in the present campaign conservative surgery was largely aimed at, and with the most gratifying results. By following the sound rules of antiseptic surgery and paying great attention to the cleansing of wounds, not only operation wounds, but also gunshot wounds, healed in a manner almost phenomenal.

The number of different varieties of fire-arms used caused much variety in the characters of the wounds inflicted. The Martini-Henry, Snider, Enfield, Winchester, sporting rifles, and the old *jezail* were all in use by the enemy, and last but not least, the new Lee-Metford rifle, with the old solid bullet and the new Dum-Dum bullet, was also in evidence. The wounds produced by each of these weapons have certain peculiarities which must be appreciated in estimating the damage they are likely to inflict.

Of sword wounds there were few, and the wounds thus inflicted presented nothing peculiar.

The extremes of temperature must also be noted. Earlier in the century the presence of tetanus among the wounded was largely ascribed to this cause. We now, of course, know that this disease is due to a specific bacillus found in the soil, but no doubt the extreme cold of nights has, by lowering the vitality of the patient, a distinctly bad influence on wounded. Tetanus was practically absent in this campaign.

INJURIES PRODUCED BY THE DIFFERENT KINDS OF BULLETS.

It was most interesting to observe in this campaign the injuries produced by the different fire arms used by the enemy. The injury produced by a bullet depends on the rate at which the bullet is going at the moment of impact, but certain peculiarities as to the shape, density, and weight of the projectile must also be taken into account, together with the hardness and resistance of the part hit.

The enemy used a large variety of rifles and guns, commencing with the old long-barrelled smooth-bore *jezail* with its round bullet. Next the Snider rifle, some of which were locally manufactured in the country, the barrels being made up of bits of barrels from our arsenals, and in which the rifle grooving often did not fit; and although they made in many instances capital shooting, the inequality of the rifling must have caused some peculiarity in the wound.

The Martini-Henry was largely used and the Lee-Metford rifle, of which the enemy had some before, and secured a comparatively large number during the progress of the campaign. For the latter they had a good deal of the old ammunition and also some of the new Dum-Dum ammunition.

In addition to bullet wounds some wounds were evidently due to slugs made of telegraph wire, rails, etc. An officer of the 15th Sikhs was hit in the face by such at close range; the wounds were situated in the face and scalp, and were ragged and very painful. One slug wounded the fifth nerve and caused numbness of the upper part of the palate of the left side of the face.

The general characters of the wounds inflicted by each class of bullet will be briefly noted:—

The round bullet.

The wound of entrance was large and punched out, the wound of exit being larger than that of entrance, and the skin often everted. The margins of the wounds were bruised, much extravasation appearing in a few hours in the surrounding tissues. From the loss of velocity in its passage through the body the bullet often lodged and was found close under the skin on the opposite side of the limb. If the bullet struck bone the fracture was of a comminuted character, the fragments being large and much displaced, and often the bullet remained among the fragments, being flattened by its impact on bone. Pieces of clothing were apt to be carried in by the bullet and the wound to take on a septic course in consequence. The bullet, in several instances in this campaign, struck the ribs and other bones and ran round the outside of the cavity, emerging some way from the seat of entrance, at first giving the idea of a much more severe wound than had really taken place.

The Snider bullet.

This, from its weight and size, produced at moderate ranges (600 yards) very severe results. The rifle was used a good deal by the enemy, and some of the most destructive bone lesions were the result of this bullet. The wounds of entrance and exit are comparatively large when compared with the

Martini-Henry and Lee-Metford, but do not present the same bruising as that produced by the round bullet. The effect on the bones is very severe, much comminution and extensive fissuring taking place. The wound of exit is often large and has fragments of bone, muscle, tendon, etc., blown out. At the longer ranges these effects are not noted. MM. Delorme and Chavasse of the Val de Grâce, according to Stevenson, state that when the exit wound is equal to, or greater in diameter than, the thumb or index finger, it is a sure sign that fracture of the bone with free splinters is present.

The Martini-Henry bullet.

The effects of the Martini-Henry bullet are of the same character as the Snider, but the bullet is smaller and has much greater velocity. The wounds of entrance and exit are, therefore, smaller if the bullet passes clean through the limb. There is but little bruising of the skin at the wounds of entrance and exit. The fracturing and fissuring of bone are very severe, especially at the shorter ranges.

The Lee-Metford bullet.

Two bullets are at present in use and both of these were used by the enemy. The one is known by the name of the solid bullet. In this the lead core is completely covered by a cupro-nickel case. With this bullet the effects on soft parts do not seem great. The bullet passes through the parts with tremendous velocity, the entrance and exit wounds being very small, and the parts heal rapidly. If the bullet, however, touches the bone the effects are very great, and tremendous shattering and fissuring takes place, especially at short ranges. The exit wound in these cases is usually large and fragments may be blown out.

In the Dum-Dum bullet the soft lead core is exposed ; on impact the bullet expands or "sets up" as it is technically called, and the injury caused by the bullet is enormous, wounds of the most terrible description being produced. The shock caused is also very great. Whether this bullet always "sets up" in the manner designed is questionable. In one case in the present campaign a Dum-Dum bullet fired by the enemy passed through the chest of a soldier and was extracted just on the second rib in front. In this case the bullet, which was declared by experts to be undoubtedly a Dum-Dum bullet, had not expanded. It was probable that the range was a very long one, as otherwise the bullet would not have lodged. In another case the bullet entered a tent which was rolled up on a mule, and although it nearly penetrated through the roll it was unaltered in shape. Although we had no opportunity of seeing the enemy's dead or wounded, private information was received that the wounds inflicted by our troops with this bullet were very severe. Attention will be drawn later to some undoubted examples of wounds caused by this bullet among our own troops.

ASEPTIC SURGERY IN THE FIELD.

There is no need to defend a system which by universal consent gives the best result in all surgical conditions ; the only point of discussion is the best way of obtaining asepsis in military surgery. This is a great difficulty, and all the attention of the military surgeon must be directed to the non-infection of the primary wound. If the presence of a few bacteria were sufficient to render a wound thoroughly impure, we should feel the utter futility of any procedure directed against such infection. In the majority of wounds some slight infection is certain almost to occur, however much the surgeon guards against it. As a matter of fact healthy tissue is capable of dealing with a certain amount of bacterial infection, and it is only when the quantity of micro-organisms present rise to a certain numerical standard that infection takes place. The quality of the bacteria present has a great influence on its power of infection. It is a well known fact that bacteria obtained from a place such as a ward where wounds have been in large numbers continuously treated, are much more virulent than those germs present in the outside air or rooms which have not been so used. On this account wounds treated in the field are more liable to remain aseptic, as the air is pure and fresh, and free from virulent micro-organisms. As a rule the soldier at the time of his wound is in good health and is able to cope with a greater germ infection than if debilitated and weak. Against these two points, which are in favour of a non-septic condition of the wound, the dirt and difficulty of cleanliness incidental to field service must be remembered. A very common method of infection is by pieces of the clothing being driven into the tissues by the bullet.

We may take the action of Dargai as an example of the difficulties experienced by military surgeons in the aseptic treatment of wounds. The dressing station in this engagement was situated in the small village of Chagru Kotal, just below the heights of Dargai, the only position which could be selected for military reasons. Water was only obtainable from a small village pond which was foetid in the extreme, and contained, no doubt, the urine and fæces of men and animals. The boxes containing the surgical dressings were covered with dust, after the march, and the dressings were obliged to be handled by men whose hands were dirty. A worse outlook from an antiseptic surgeon's aspect could hardly be imagined. If one had been obliged to perform the primary operations under these circumstances infection of the wounds must have ensued. The number of wounded was so large that the wounds were only treated with a first dressing and necessary splints, and were sent down to Shinowrie the next morning for further treatment or operative measures. In standing camps, such as Maidan and Bagh, better arrangements could be made, but the clouds of dust on instruments, operators, assistants, and on the wound area itself, made antiseptic surgery especially difficult to carry out. The presence in the equipment of a good filter, such as the Berkfeld or Pasteur-Chamberland and the inclusion of a small handy sterilising apparatus, would do much to ensure a better condition.

The cleansing of the skin by soap and water, turpentine and carbolic lotion, is especially necessary in the case of men on service; soldiers have often not been able to maintain the proper standard of personal cleanliness and the proper cleansing of the operation area is of the first importance. The syringing of bullet wounds with an antiseptic lotion should be employed, but it will be found extremely difficult to syringe through the track of a bullet owing to the change in the position of parts from that in which the wound was received. The complete arrest of hæmorrhage before a dressing is applied, is most necessary; by this means we leave no serous fluid for the cultivation of bacteria. Drainage is demanded in many cases for the same reason. The complete co-aptation of the lips of a wound and the presence of deep sutures if required, to prevent any space being left for the collection of serous discharges, is a matter of much importance. The dressing applied to a wound should be dry and absorbent so as to soak up any discharge from the wound, and should be impregnated with some germicide. In this way the nutritive material on which the bacteria feed is removed. If a splint can be applied to the part this should certainly be done, quite independent of the presence of a fracture, as it protects and keeps the parts at rest. Any injury to the tissues of a wound is especially harmful, as injured tissues have not the same power to deal with septic organisms as those which are healthy. This fact should make us very careful to avoid any rough usage in the manipulations of a wounded part, such, for instance, as in the removal of a bullet, etc. A clean cut with a knife is much to be preferred to pushing and dilating with the finger which must result in injury to the tissues, the opening of planes of fascia, and a diminished power to withstand the influence of septic organisms.

The first step in the aseptic treatment of wounds in the field is the proper application of the first field dressing, no handling or examination taking place. At the field hospital the surgeon can examine the wound at leisure and with care, and if necessary give chloroform and make a complete examination. Having determined the exact amount of injury, he can then decide on the treatment to be adopted, and carry it out at once. The case is then dressed and is ready for transfer to the base. If all goes well, the original dressing will not require removal for some days, the absence of fever and painlessness of the part indicating that no interference is necessary or advisable.

The presence of clothing or other foreign bodies in the wound often causes a septic condition. This was noticeable in the men of Highland regiments who were shot through their sporrans, the wound often being full of the hair from it. The removal of all foreign bodies must be carefully attended to, and the syringing of the wound with some antiseptic lotion resorted to. In cases of septic sinuses the method of swabbing them with pure carbolic acid, as recommended by Watson Cheyne, might be tried with success.

The following case is instructive with regard to the septic condition of a wound set up by a foreign body :—Captain de S. S., Royal Scots Fusiliers, was shot in the left hand on the evening of the 13th December, 1897. The bullet entered the ulnar side of the hand; there was no wound of exit. This officer was also shot in the chest, and at first penetration of the chest was feared. The bullet could be felt lying deep in the palm of the hand, on the head of the second metacarpal bone. The bullet was removed on December 16th. The second and third metacarpal bones were found to be fractured. The bullet was a round one. Some suppuration of the palm commenced and the track was well syringed out, but the suppuration increased and several deep incisions had to be made into the palm, dorsum of the hand and fore-arm. On January 6th, 1898, a piece of a glove, which the patient had been wearing at the time of the receipt of the wound, was washed out by syringing; it had evidently been entangled in the fractured metacarpal bones. After prolonged and most troublesome suppuration the case recovered, but with a damaged hand.

CLASSIFICATION OF WOUNDS.

It will now be interesting to discuss the wounds according to the locality affected. According to the statistics received, 923 men were killed and wounded during the portion of the campaign now under review. The number of wounds of each locality will be found in the following table :

Injuries and Wounds—Tirah Campaign.

Wounds, Head, penetrating	29
„ „ Non-penetrating	14
„ of face	26
„ „ Neck	11
„ „ Chest, penetrating	53
„ „ „ non-penetrating	19
„ Abdomen, penetrating	45
„ „ non-penetrating	10
„ Neck and spine	35
„ Perineum and genitals	5
„ Groin	13
„ Buttock	24
„ Shoulder	37
„ Arm	63
„ Elbow	13
„ Fore-arm	21
„ Wrist	11
„ Hand	32
„ Phalanges	7
„ Hip-joint	6
„ Thigh	126
„ Knee	27
„ Leg	93
„ Ankle	8
„ Foot	36
„ Toes	2
„ Arteries	3
„ Nerves	0
„ Parts not defined	146
„ Other injuries	8
	923

Wounds of the Head.

Wounds of the head do not in this campaign bear a very large percentage to wounds of other regions. In the Crimea they constituted in both French and English armies about 20 per cent. of all wounds. But in the Crimea a good deal of the fighting was in entrenchments and earthworks where the head was more exposed than the rest of the body. Stevenson gives 12 per cent. as being the average ratio of wounds of this part compared with other localities. The majority of wounds of the head are, it is needless to say, rapidly fatal, and therefore do not come under treatment at all.

Very few sword wounds were met with at all in the campaign, and sword wounds of the skull were consequently very rare. In one case, which came under observation, death resulted immediately from such a wound. No. 3025, Private C. E., Royal West Surrey Regiment, was attacked at close quarters while on convoy duty in the Arhanga Pass. He was killed by a sword cut of the skull which extended from the left temporal bone to the occipital eminence on the left side, fracturing extensively the occipital bone. The wound was six inches long and the brain matter was protruding. Another cut extended downwards behind and below the left ear into the neck.

In the case of an officer, Captain E. Y. W., of the Indian Staff Corps, who was shot through the head at Camp Maidan, the bullet passed through the skull, causing great fissuring of the temporal and parietal bones. Death occurred in a few minutes from profuse hæmorrhage and shock.

An interesting case occurred on the march down the Bara Valley:—No. 3684, Private G. G., of the Royal Scots Fusiliers, was hit in the middle of the forehead, probably by a round bullet; the bullet penetrated his frontal bone, but there was no wound of exit. He was brought to the field hospital unconscious and was carried down by dandy to Mamanai. He was quite unconscious and passed his urine and fæces under him. His breathing and pulse were regular; he could swallow milk and beef tea. The man lived from the 4th to the 17th December, when he was transferred to the base. He died, however, the next day at Ilm Gudr.

The following case was also of interest:—No. 76939, Gunner G. McA., M. B., R.A., was shot while carrying a shell to the gun; he was stooping at the time he was struck. He fell unconscious, was placed in a dhoolie, and carried in as dead. In half an hour the symptoms of concussion passed off, and he vomited. The entrance wound was in the upper part of the frontal bone on the right side; the bullet passed downwards, grooving the right parietal bone; it then passed downwards through the right axilla where it lodged; and the bullet, a solid Lee-Metford, was removed at the anterior border of the right axilla. He partly regained consciousness in twelve hours, passed urine and took drink; there was almost complete paralysis of the lower limbs; gradually he fully regained consciousness and recognised his attendants, but was very irritable and restless: there was continual oozing of blood from the wound. On admission at Nowshera on February 14th, he had again become unconscious, brain matter was bulging out of the lower wound, the pupils were equal, and re-acted to light. The left arm was stiff and contracted; he occasionally moved his right arm; the left leg was rigid and the toes markedly flexed. He remained unconscious, passed his motions and urine involuntarily and died on February 16th. The post mortem examination, for the notes of which I am indebted to Surgeon-Lieutenant Ward, A.M.S., showed that the bullet had grooved the parietal bone; the groove was about a quarter of an inch wide; the inner table was not splintered; the groove was about three inches long, and no secondary fractures or splintering extended from this. The brain surface underlying the wound was of a very soft pulpy consistence, and this condition extended deep into the centre of the brain; small fragments of bone were intimately mixed with the brain substance; there was some purulent matter at the base of the brain and in the left ventricle and choroid plexus.

That some of the cases of gunshot wounds of the head lived I had an opportunity of observing at the Base Hospital at Nowshera. There were two cases, one in the British, the other in the Native Base Hospital, in which the bullet had passed through the bones of the cranium, injuring the brain; both these cases were recovering.

Wounds of the Neck.

Two very interesting wounds of the neck involving the trachea and œsophagus were met with. In both, the main arteries and nerves escaped injury. Military surgeons have previously noted the liability of the large vessels to escape injury, although the course of the bullet would seem to indicate a certain wound of these structures. Stevenson gives the death rate in the Franco-German War at 13 per cent., and in the American War at 12·6 per cent. In the official return of wounds, eleven are given as the number of wounds of the neck; the mortality is not given.

Case I.—Sergeant Drummer M., of the Northampton Regiment, was shot in the neck on December 13th, 1897. The bullet first struck him on the right arm quite superficially, then passed through his neck, and finally ran down the left arm, making seven holes in his left coat sleeve but without touching the flesh. At the moment he was shot he was raising himself from the ground. The entrance wound in the neck was situated just in front of the anterior edge of the stern-ocleido-mastoid muscle, and in front of the carotid artery. The bullet then passed through the trachea below the cricoid cartilage, and passed out in the same line on the opposite side. The bleeding and dyspnœa were very urgent, though the main arteries were untouched, and the wounds had to be plugged to arrest the hæmorrhage. He was admitted to the Field Hospital. Here he tried to eat a piece of bread, and this attempt made him choke and set up very severe hæmorrhage. When he attempted to drink some milk it was found to return through the trachea; it was evident that the œsophagus was also wounded. He was fed by rectal enemata for some days. He was transferred to the Base Hospital, Nowshera, and slowly recovered. The wound in the œsophagus healed, and that of the trachea began to granulate and contract. On January 6th, 1898, it was noted that he could now swallow liquid food and was up and about. At this time two holes existed in the trachea, but these were granulating well and getting much smaller. When the wounds were covered with plugs he talked well, but, of course, when removed he was voiceless. The man made a complete recovery and no stricture of the œsophagus was noted on his discharge to England.

Case II.—No. 1631, Sepoy G. B., 28th Bombay Pioneers, was shot in the neck at Mamanai on January 17th. The bullet entered just in front and below the angle of the jaw on the left side. The wound of exit was immediately behind the sterno-mastoid muscle on the right side, one and-a-half inches above the clavicle. The wound bled a good deal, especially from the wound of exit, and the air bubbled through this wound. The bullet had evidently wounded the larynx and pharynx. When admitted to hospital his voice was lost, and on an attempt at swallowing the fluid came out of the wound of exit. He was fed with a tube. On February 20th it was noted that the wounds had completely healed, and that he could take solid food. His voice was strong and natural.

Wounds of the Face.

These do not call for much remark. Several very narrow escapes were chronicled in which the bullet just grazed the face. The wounds healed by granulations, as any other contused wounds would do. In some cases the injury was so trivial that the men remained at duty. Some cases of fracture of the upper and lower jaw came under notice. The deformity produced by some of these wounds of the face was great. The following cases are of interest:—

Case I.—No. 4485, Private C., K.O.Y.L.I., was wounded at Shinkamar on January 29th, 1898. The bullet entered at the alæ of the nose on the right side, passed through the roof of the palate, grooving the tongue, and passed out at the angle of the lower jaw on the left side, fracturing the jaw. It then entered an inch below the clavicle on the left side and was extracted, lying under the skin at the interior fold of the left axilla. The hæmorrhage was not very profuse. The fractures eventually consolidated and the case did well.

Case II.—No. 4459, Private A. S., Dorset Regiment, was wounded at Dargai, October 20th, 1897, and transferred to No. 1 British General Hospital, Rawal Pindi, on November 4th. The bullet, which evidently entered from above, had its wound of entrance a quarter of an inch above the left orbit, and a little to the inner side of the middle line of the orbit; it passed through the orbit and emerged in the centre of the hard palate; it was probably then spent and presumably rolled out of the mouth, as the lower jaw and floor of the mouth were not injured in any way. The sight of the left eye was destroyed. The conjunctiva was much swollen, and there was a profuse muco-purulent discharge from the left nostril. The bullet must have passed obliquely on the inner side of the orbit, as the globe was not injured in any way. The eyeball became, however, inflamed and looked likely to suppurate, and was therefore removed on November 5th. The bone of the hard palate was fractured in the middle line. The discharge from the left nostril continued for some weeks. The man eventually made a good recovery and was invalided to England, 20th February, 1898.

In another case the cicatrix remaining after the healing of a sword wound much impeded the action of the jaws, and made eating difficult.

Case III.—No. 4301, Lance-Corporal H., Royal Scots Fusiliers, was wounded on December 13th, 1897. He received sword cuts on both thighs and on the right side of face. He was admitted to hospital the next day, when the wounds were thoroughly cleansed and brought together. The wound on the face was an oblique one, across the angle of the jaw on the right side, almost down to the bone and continued into the neck. Hæmorrhage had evidently been very free and the wound was gaping and filled by a large firm blood clot; when this was removed a small vessel was found to require ligature. The wounds did not unite by primary union. On February 10th the wounds of both face and thighs had firmly cicatrized. The cicatrix on the right side of the face prevented free movement of the jaw. The mouth could be only partially opened and mastication was difficult and painful. There was also anæsthesia of the parts around. The wounds of the thigh were firmly united and motion not impaired.

Wounds of the Upper Extremity.

These comprise nearly 20 per cent. of all injuries during this campaign. Of 923 wounds 184 were of the upper extremity, made up as follows:—

Shoulder	37
Arm	63
Elbow	13
Fore-arm	21
Wrist	11
Hand	32
Phalanges	7
Total	184

Wounds of the upper extremity seem as a rule more amenable to conservative treatment than those of the lower. In adopting conservative treatment we must consider the question of the usefulness of the limb that we propose to retain. It is evidently useless to attempt to preserve a limb in which the main branch of the nerve has been destroyed, or in which consolidation of a fracture will leave one which is contracted and distorted to an undue extent.

The scapula is apparently capable of sustaining great injury without any very permanent ill effects, unless the shoulder joint is implicated. The following case illustrates this:—

No. 4312, Private F. R., Northampton Regiment, was hit in the right scapular region. The wound of entrance was to the right of the middle line of the back, at the inner extremity of the spine of the scapula, the wound of exit being at the outer extremity of the right shoulder. The spine of the scapula was shattered, but the shoulder joint not opened. A good deal of loose bone ultimately came away. A few weeks afterwards the motions of the arm were good, and the parts healing rapidly.

An interesting case of gunshot wound of the shoulder joint occurred in which primary excision of the joint was undertaken :—No. 38, Private I. B., Gordon Highlanders, was admitted to hospital, 18th November, 1897, after the first action at Dargai. with a bullet wound of the left shoulder. There was no wound of exit. The next morning patient was placed under chloroform and a thorough exploration made. An incision was made by Surgeon-Major O'Keefe, who was in charge of the case, from the top of the acromian process downwards for three and-a-half inches. The head of the humerus and about two and-a-half inches of the shaft were shattered to such an extent as to render excision of the joint advisable. All loose fragments of bone were removed. The bullet (a Snider) was ultimately found deeply imbedded under the pectoral muscles, lying on the first rib, which apparently was not fractured. The case was transferred to the Line of Communication Hospital. When seen on January 10th, 1898, he was doing very well. There was a small sinus leading apparently to a loose piece of bone. The motion was a good deal restricted, especially abduction, but the movements will probably greatly improve.

The question of primary excision against conservative treatment seems still unsettled. In the American War primary excision gave a mortality of 31·06 per cent., conservative treatment a mortality of 27·5 per cent., secondary excision 29·3 per cent., and if amputation was ultimately required the mortality was only 28·7 per cent. So that from statistics it would seem advisable to attempt conservative methods, and if, finally, secondary excision or amputation is necessary, the rate of mortality is less than that of primary excision.

A case of secondary excision of the shoulder joint was attended with good results:—Private H., Devonshire Regiment, was wounded in the shoulder at Karappa by a Martini-Henry bullet. The bullet entered the point of the shoulder joint below the acromian process. There was no wound of exit and the probe passed about one inch downwards and backwards, but the bullet could not be detected. He was examined with the *x*-rays, and a linear fissure, about an inch long, was seen on the upper surface of the head of the humerus, but no bullet. An incision was made straight downwards and it was found that the capsular ligament had been opened and the little finger could be passed for at least half an inch into the head of the bone. It was also discovered that a large abscess had burrowed under the pectoralis minor into the axilla, and another abscess existed behind the neck of the humerus, down the posterior surface of the arm, for about three inches. Counter openings were made and free drainage secured. The case was then transferred to Kohat where the head and surgical neck of the humerus were excised, and the bullet discovered in the cancellous tissue of the head of the humerus. The wound in February was healed and the motion good, but abduction very limited. He will, however, improve.

A most interesting case was noted in which the bullet, believed to be a solid Lee-Metford, was supposed to have drilled a hole through the head of the humerus :—No. 4205, Private O'B., 2nd Yorkshire Regiment, was admitted to No. 1 Base Hospital, December 14th, 1897. He was wounded on November 29th. The wound of entrance was at the back of the shoulder through the outer and posterior fibres of the deltoid muscle. The wound of exit was in front on the anterior aspect of the joint, in front and a little to the outer side of the head of the humerus. Both wounds of entrance and exit were very small. The wound of exit healed readily, that of entrance was rather delayed. It seemed impossible that the head of the humerus could have escaped injury, and the only explanation seems to be that the bullet perforated the head of the bone without splintering it. He was discharged in January, quite cured, and with free movement of the joint.

Some very extensive injuries of the shaft of the humerus were caused by gunshot. In one such case amputation at the shoulder joint was required.

Captain A. G. N., 1-2nd Gurkhas, was wounded in the Bara Valley on December 11th, 1897. The bullet entered the posterior surface of the arm about two and a half inches below the point of the shoulder. It shattered the humerus and emerged at a corresponding level on the front of the arm. There was profuse hæmorrhage which came from a large vein, probably the brachial. He himself applied digital pressure for three-quarters of an hour. He was then seen by a medical officer and a tourniquet was applied. He was ultimately out all that night in a house which was being attacked, and no further treatment was possible at the time. The next morning he was brought into camp, and an examination made, when it was found that the brachial artery was uninjured. There was great œdema of the hand and arm and the limb was cold. Much collapse and bodily shock were present; it was therefore deemed unadvisable to interfere further till food and stimulants had been administered. In the afternoon chloroform was given and a careful examination made. It was then ascertained that the humerus was extensively fractured. There were two large flesh wounds on the anterior surface of the arm through which several large pieces of bone and muscle protruded. The main trunks of the brachial plexus were also shot through. An exploratory incision was made through the deltoid, and it was discovered that the humerus was fractured as high as the anatomical neck, and that the continuity was completely destroyed for about two inches below the surgical neck, and several large pieces of the shaft were denuded of periosteum and thrust into the muscular tissues. It was therefore decided to amputate at the shoulder joint. The operation was performed by Surgeon-Major Beevor, who was in charge of the case. Owing to the destruction of the soft parts a short upper and a long lower flap were fashioned. On examination of the humerus after removal it was found that a large fissure extended to within an inch of the elbow joint. There was no secondary hæmorrhage, and the officer made a rapid recovery in spite of his being subjected to movement for several consecutive days immediately after the operation. He was discharged from Nowshera convalescent on January 16th, 1898.

The two following cases of fracture of the shaft of the humerus illustrate a large number of cases :—

Private R., Gordon Highlanders, was wounded at Dargai on October 20th. The bullet entered the pectoral region three inches below the clavicle and passed downwards and outwards across the surgical neck of the humerus, shattering this in its course. The wound of exit was at the posterior and outer aspect of the arm. The shaft of the bone was much shattered. He was at once transferred to the base. Here a longitudinal incision from the acromian process was made and several loose spiculæ of bone removed. The parts healed well and consolidation of the fracture took place. When seen on January 26th he had a good sound arm, which was rather powerless, but would improve.

No. 4410, Private W., K.O.Y.L.I., was shot at Shinkamar on January 29th. The bullet entered the arm on the posterior aspect just below the level of the posterior fold of the axilla, and passed out in front at the level of the anterior fold of the axilla. The bone was fractured in its upper third; both wounds of entrance and exit were small, and were probably caused by a solid Lee-Metford bullet. The arm was immobilised and dressed with antiseptic dressing, and did well. The fracture united without trouble, and no suppuration delayed convalescence.

The next case was an injury of the circumflex nerve, caused by a gunshot wound of the shoulder :—No. 4069, Private R., Gordon Highlanders, was wounded on December 6th, 1897, in the Bara Valley, by a bullet which entered at the point of the left shoulder and came out inside at the inner border of the scapula, just below the level of the spine of the scapula. The wound healed well but the patient complained of much weakness of the arm and loss of power. The deltoid now (February 14th) looks flattened and wasted and the skin over it is anæsthetic. The case was examined with Röntgen rays but nothing abnormal could be discovered.

In two cases the shaft of the humerus was badly fractured; in one case amputation was considered necessary :—

No. 4406, Private T. K., K.O.S.B., was shot going on picquet on November 21st. The wound of entrance was on the inner side of the right arm just above the elbow. The course of the bullet was upwards and outwards; the wound of entrance was small, but that of exit was about the size of a five shilling piece; its edges were torn and shreds of muscle protruded. On examination, under the influence of an anæsthetic, with the finger, a compound comminuted fracture of the humerus at the junction of the middle and lower thirds was found. None of the splinters were loose. The arm was placed on a rectangular splint and the wound dressed with a dry antiseptic dressing, and he was transferred to the base. Here extensive suppuration took place, and on January 10th dead bone could be felt at the seat of fracture and the wound was suppurating. Some bone came away, and he eventually got a useful arm.

No. 4871, Private R. B., R.S. Fusiliers, was hit by a round bullet on November 29th. The bullet entered the posterior surface of the arm, in the middle third. On examination by the finger the middle third of the humerus was found to be extensively fractured, the fragments being large and a good deal displaced. The bullet, a round one, was found flattened against the bone; this was removed and the arm placed on a rectangular splint. Extensive suppuration took place, and secondary amputation above the fracture was considered advisable. The case afterwards did well. On examination of the bone after amputation, several large fragments of bone were found quite loose and denuded of periosteum, and bathed in pus. No attempt at repair had occurred.

There seems to be no doubt that conservative surgery should be attempted in gunshot wounds of the shaft of the humerus. The wound should be explored and all loose fragments removed. The operations of excision of the ends of the shaft of the humerus has altogether fallen into disrepute. If the wound remains aseptic the fragments readily join, and if secondary amputation is ultimately required, the results are extremely favourable. The only indications for amputation seem to be wound of the main artery or nerves with extensive fracturing of the bone.

Wounds of the Elbow Joint.

With regard to treatment of wounds of the elbow joint some diversity of opinion still exists. The natural leaning of the surgeon in the present day is towards conservative methods, and with the help of antiseptics and the chances of asepsis, the field in which conservatism may be attempted is much enlarged. If the joint is merely opened or the comminution slight, there is no question that conservatism should be employed. It is different, however, in those injuries in which the ends of the bones are much shattered and comminuted. Here the choice lies between primary or secondary excision of the joint and amputation. Primary excision does not seem to be a favourite operation in military surgery. Otis did not report well on the results of this operation in the American War. Military surgeons are agreed that primary excision is to be much preferred to secondary excision of this joint, and all condemn the operation in the intermediate stage. Is excision of the elbow a suitable operation in a campaign, such as we are now discussing? The conditions of the after treatment must be remembered. The most favourable result after the excision of the elbow is to obtain good movement. The operator, as a rule cannot by his own endeavours ensure this himself, as the case generally passes at once out of his hands, and ankylosis will probably be the result obtained. This to be of service must be in a good position, or the result can hardly be considered satisfactory. In cases in which the articular ends of the bones are much fractured and comminuted, and extensive fissuring has occurred, it would seem the best treatment to amputate, as if several inches of the bone require removal, a useless limb must infallibly result.

The notes of two cases of great disorganisation of the elbow joint in which amputation of the arm was performed are given. Both cases recovered:—

Case I.—Captain F. F. B., an Intelligence officer on the Head Quarter Staff, was brought to hospital on the evening of October 26th, having been shot through the left elbow There was a good deal of oozing; the limb was dressed and placed on a splint and morphia given. Early the next morning chloroform was given and a thorough examination of the wound made. For this purpose both the wounds of exit and entrance were enlarged. The bullet had entered on the outer side of the left elbow joint just below the external condyle of the humerus. The wound of exit was on the inner side of the fore-arm, about three inches below the joint on the supinator surface. On thoroughly exploring the joint with the finger, it was found that both the articular surface of the ulna and radius and the articular end of the humerus were much shattered. In addition the shaft of the humerus was fissured for about three inches. After consultation it was unanimously decided that amputation was the only course to pursue, as excision would have necessitated the loss of at least five inches of bone; amputation by the modified circular method was therefore performed in the middle third of the arm. The wound remained aseptic and complete and rapid recovery took place.

Case II.—Sergeant A., 1st Northampton Regiment, was wounded in the left elbow at Maidan, November 1st, 1897. The bullet had entered on the outer side of the left elbow joint just below the external condyle of the humerus, and had passed obliquely across the joint, coming out at the inner side, about two and a half inches below the internal condyle. On examination of the joint under chloroform, great splintering of the articular ends and fissuring of the shaft of the humerus were found to be present. The injuries much resembled those inflicted on Case I. Amputation was performed in the middle third of the arm by the modified circular method. Some difficulty was experienced in getting good skin flaps, as the skin had been much damaged, and eventually the flaps sloughed. The case, however, made a good recovery.

I am not aware that any complete resection of the elbow joint was undertaken either as a primary or secondary operation during this campaign. The notes of two cases in which partial excision was performed are appended:—

No. 3034, Private I. P., Royal West Surrey Regiment, was wounded at Bagh. The bullet entered at the internal condyle of the left humerus. There was no wound of exit. Some pieces of internal condyle were removed at once, the joint opened, and all the loose bone removed. I could not trace the further history of this case.

No. 3274, Private W. C., 1st Dorset Regiment, was admitted to the Base Hospital, Rawal Pindi, on October 29th. He was wounded at Dargai. Two wounds were present: the wound of entrance situated at the back of the lower and outer extremity of the external condyle of humerus; the wound of exit was two inches in circumference, situated in front of the joint. On examination by the finger a good deal of loose bone could be felt on the outer side of the joint; the radius and ulna were intact. On November 16th the joint was laid open, and a quantity of loose and dead bone removed; the external condyle was much shattered. On February 1st the wounds had quite healed and the elbow was firmly ankylosed at a right angle. On February 9th he fell down and broke his right humerus, two inches above the ankylosed joint.

In the following case purely conservative treatment was adopted:—

No. 4582, Lance-Corporal F., 1st Gordon Highlanders, was struck by a bullet early in December, 1897, on the posterior surface of the fore-arm, four inches from the elbow joint; the bullet emerged at the point of the elbow. The bullet passed through the elbow joint, but did not shatter it to a great extent. The arm was put up on a rectangular splint and treated conservatively. In February the suppuration was still profuse. The man looked much debilitated and broken down in health, and the joint was considerably swollen.

An interesting case occurred in which a gunshot wound fractured both bones of the fore-arm and wounded the radial artery. The patient, a Gurkha, was shot in the left fore-arm. Both bones of the arm were fractured about two and a half inches below the elbow joint, and the radial artery was wounded. The brachial artery was tied in the lower third, and the arm and fore-arm placed on a splint. No secondary hæmorrhage occurred, and the case did well.

An interesting case, illustrating the good effects of the use of the Röntgen rays in all doubtful bullet injuries, or loss of power after bullet injuries, may be recorded here:—No. 2082, Rifleman G. S. G., 1-2nd Gurkhas, was wounded early in December in the Bara Valley. The bullet entered just below the shoulder joint on the anterior aspect of the arm. There was no wound of exit. The man was believed to have been shot from above and the track of the bullet seemed to lead downwards to the elbow joint. No bullet could be felt. While under treatment at the base it was found that he could not fully flex or extend the fore-arm or the arm. There seemed to be no disease or abnormality about the joint. Surgeon-Major Beevor applied the *x*-rays and a bullet was found to be lying just above the joint in the tissue of the brachialis anticus. This, although a big Snider bullet, could not be felt by the fingers. The wound of entrance had completely healed. On removal of the bullet perfect motion was restored.

Wounds of the fore-arm.

Amputation of the fore-arm was required in some cases of gunshot wound of this part on account of great disorganisation. Two cases came under my notice. Both were in No. 44 Native Field Hospital, under the charge of Surgeon-Major Thompson, who performed the operations :—

Case I.—The bullet had entered on the inner side of the right fore-arm, and burst through the palm of the hand, smashing up the carpal and metacarpal bones on the inner side, and opening the wrist joint. The bullet then traversed the palm and made its exit at the metacarpo-phalangeal joint of the index finger on the dorsum. The whole palm was disorganised. From the amount of injury and the smallness of the wound of entrance the wound was considered one probably caused by a Dum-Dum bullet. The fore-arm was amputated by skin flaps and circular through muscle in the middle third No drainage was required, and the operation pursued an aseptic course, with complete recovery.

Case II.—Lance Naique B. S., 15th Sikhs. The wound of entrance was to the radial side of the left fore-arm about three inches below the elbow joint; the wound of exit was on the ulnar side of the wrist joint, and was a large lacerated wound. The lower end of the ulna was fractured and also the head of the second metacarpal bone. Amputation was performed on account of the disorganisation of muscles, etc, in the middle third, by lateral skin flaps and circular incision through the muscle. The wound healed well.

As a rule gunshot wounds of the fore-arm in which only one bone was fractured healed well without much impairment of motion. In some cases the process was very tedious and prolonged. The following is an illustrative case of such :—

Captain S., 36th Sikhs, was on sick leave at home. When he heard his regiment was ordered on service he managed to come out and join it. This he did at Maidan on November 6th, 1897. On that afternoon he was walking in the camp when he was struck in the left fore-arm by a bullet fired by a sniper. The wound of entrance was on the anterior surface of the fore-arm just above the wrist, over the lower end of the radius. The wound of exit was on the posterior surface of the arm, four inches above the wrist. The radius was much shattered but none of the fragments were loose; the ulna was intact. The wound was thoroughly examined with the finger under chloroform, well syringed out, and put upon a splint. He had no secondary fever at this time, and appeared doing well. On the journey down to the base the movement caused great pain and on arrival at Kohat the arm was inflamed and painful. Later he had two or three abscesses which required opening and pieces of bone have been from time to time removed. On January 30th the arm was still discharging and the patient looked wasted and ill. He was sent home. When he left the wounds were still open and the termination of the case seemed doubtful.

As a contrast may be mentioned the case of Lt. O., Oxford Light Infantry, who was shot through the fore-arm just above the wrist, the radius being fractured. In three weeks the fracture had consolidated, and with the exception of some loss of power in the fingers from some involvement of the nerve, motion was good.

An interesting case of attempted conservatism of a gunshot wound of the hand deserves notice.

No. 4247, Lance-Corpl I. O., Northamptonshire Regiment, was brought into hospital on November 9th with a gunshot wound of the hand. The bullet had entered just at the junction of the carpal and metacarpal bones on the outer side of the right hand, about one inch below the styloid process of the radius. The bullet passed forwards and inwards as the hand lay pronated. The second, third and fourth metacarpal bones were extensively shattered and partly blown out of the wound. These were replaced as far as possible, after all spiculæ had been removed and the hand dressed, and put on a splint. The case was transferred to the base, 14th November, 1897. Here the case did not do well and amputation above the wrist was performed on 11th December, 1897. He recovered with a good stump.

Several cases of bullet wounds of the hand occurred; most of these call for no particular remark. In some cases removal of fingers or fashioning of stumps had to be undertaken. An interesting case of sword wound of the hand with severance of the tendons occurred, in which suture of the tendons was attended with good results :—

No. 3442, Private A. P., was admitted on December 1st with a sword cut of the left hand. The man lifted up his arm to protect his head and received a sword cut through the ulnar side of the hand, severing the fifth metacarpal bone and extending deeply into the palm, cutting the tendons on both anterior and posterior aspects. The fifth metacarpal bone and little finger were amputated and the tendons sutured. On January 20th, 1898, the wounds had all healed and flexion and extension had returned in the other fingers to some extent.

Injuries of the Spine.

The immediate mortality of gunshot injuries of the spine in war depends on the part of the spinal column which is injured. Otis gives the following rate of mortality in the American war :—

70·0	per cent. in the cervical region.
63·5	" " dorsal "
45·5	" " lumbar "

In 642 cases of gunshot wound of the spine recorded in the American war the total death rate was 55·5 per cent. In those in whom recovery ultimately took place, this seems usually to have been incomplete.

Two cases of gunshot wound of the spine were admitted into the Base Hospital at Nowshera. Both these cases proved fatal.

Case I.—Lt. H. D. H., R.A., was wounded in action on January 1st, 1898. The bullet struck him in the centre of the back at the twelfth dorsal and first lumbar vertebra. The patient fell at once, paralysed below this level. The lower limbs, bladder, and rectum were completely paralysed. There was slight cutaneous sensation on the outer sides of the thigh. About a week after the injury, on his admission to the Base Hospital, bed sores had begun to form on the prominent points of the pelvis and bullæ on the right leg. The original wound had been enlarged for the purposes of examination, and a large gaping wound existed from the tenth dorsal to the first lumbar vertebra. On examination by the finger great shattering of the vertebra was found to exist. The Röntgen rays were employed to locate the bullet, but failed to do this with certainty. The injury was followed by traumatic fever, the temperature falling to normal on January 19th. On January 23rd the patient had a rigor and the temperature rose to 105°, and from that date to the date of death, on February 8th, the temperature ranged between 102° and 104° F. The bullæ on the legs, which had formed almost immediately after admission, became discoloured, and a herpetic eruption on the outer side of the left leg broke down into an open sore with extensive sloughing. By February 1st bed sores had formed on every point exposed to pressure and the sacrum and coccyx were nearly completely exposed. In spite of this the original wound over the vertebra progressed most favourably and at the time of death was almost healed. At the beginning of February the pulse became weaker. On February 4th the respirations became much hurried and he had a cough and rusty sputa. On the morning of February 5th these symptoms had entirely disappeared. The patient was now only semi-conscious. There were violent twitchings of arms and neck. These symptoms were followed by complete coma, and in this condition he lasted till February

8th. No post mortem examination was held. The bullet was believed to have severed the cord at the level of the first lumbar vertebra. As usual in these cases the formation of bed sores was very rapid, and bladder trouble complicated the case. The cause of death was, no doubt, spinal meningitis with ascending myelitis. I am indebted to Surgeon-Captain Donegan, A.M.S., for these notes.

Case II.—Sergeant Major D., Oxford Light Infantry, was wounded on December 30th, 1897. The bullet entered in the left lumbar region, just behind the post axillary line, and midway between the last rib and the crest of the ilium, making a ragged wound about the size of a rupee. The gut was not wounded nor the peritoneal cavity opened. The bullet passed across the spine, fracturing apparently the spinous processes of the second and third lumbar vertebræ. The patient had complete paralysis of the lower limbs, of bladder and rectum. He had very large bed sores over the sacrum and coccyx. On February 20th it was noted that he could contract the muscles of the thigh slightly and had some returning sensation; he also complained of severe burning pains in the heels. In March he ate some tinned peas which set up acute enteritis from which he died. On post mortem examination the bullet was found loose in the spinal canal, with a covering of clothing. It had entered between the second and third lumbar vertebræ under the transverse process. Röntgen rays failed to demonstrate the position of the bullet in either of these cases. In the latter had the exact position of the bullet been known, removal could have been safely carried out. I am indebted to Surgeon-Lieutenant Ward, A.M.S., for notes of the latter case.

Wounds of the Pelvis.

Wounds and fractures of the pelvis bone themselves are not a particularly fatal injury; the implication of the organs these bones protect is of far greater importance. The difficulty in locating and removing a bullet which has lodged is also very great. In many cases in which the bullet has lodged and injured the bone, the chronic suppuration which is set up ends fatally.

Several cases of wound of the pelvis came under observation, the most interesting being the following:—

Case I.—In which the rectum was injured. No. 3404, Lance-Corporal G. B., Dorset Regiment, was shot on November 7th, 1897. The bullet passed right through the pelvis, entering on the right side above the great trochanter, and passing out in the same situation on the opposite side. The next day fæces passed through the wound on the left side, and evidently very free extravasation was taking place in the pelvis. The bladder was not implicated. None of the big vessels were wounded. The man died from peritonitis on November 11th. He was much collapsed on admission, and it was not considered advisable to open the abdomen and attempt the suture of the gut.

Case II.—In the Nowshera Base (Native) Hospital. No. 1689, Sepoy K. S., 36th Sikhs, was wounded on December 10th in the left buttock about two inches below the left iliac crest, and just above the great trochanter. The bullet had penetrated the pelvis apparently and there was no wound of exit. On admission to the base hospital a profuse discharge came from the wound. On examination of the ilium a depressed fracture of a piece of bone about the size of a rupee was discovered, with some fragments of clothing. These latter were removed, but the discharge still continued, and as the fragment of bone was lying quite loose, it was then removed; several more pieces of cloth were also discovered and removed. After a few days the bullet was found presenting in the wound, having come out of the pelvis. The bullet was removed and the case made a complete recovery.

Case III.—In the Base Hospital, Nowshera. For the notes of this interesting case I am indebted to Surgeon-Captain Smith, I.M.S.:

No. 3582, Sepoy R. S., 45th Sikhs, received the wound, December 25th, 1897, in the Bara Valley. The bullet entered just to the right side of the first sacral spine and passed obliquely towards the junction of the ilium, ischium, and pubis, of the same side, opposite the hip joint. On his arrival at Nowshera he was placed under chloroform and the wound explored. The bullet was found to have punched a hole obliquely through the sacrum, separating the bones considerably, and the index finger could be easily passed into the pelvis. A cautious search was made for the bullet, which, however, could not be found. Rough bone was felt in front about the brim of the pelvis. The patient was kept on his back, with the idea of giving the bullet a chance of gravitating to the wound. A good deal of thin, purulent discharge, such as one is accustomed to see in bone disease, continued. He was examined "per rectum" with negative results. There were no bladder or rectal symptoms. There was a good deal of pain in the right leg. The bullet was diagnosed to be lying beneath the obturator layer of the deep pelvic fascia, probably in the tisssue of the obturator internus muscle. On January 1st a skiagraph of the case was taken by Surgeon-Major Beevor. This showed somewhat indistinctly a foreign body, supposed to be the bullet, lying in the obturator internus. He soon developed a hectic temperature, and in the middle of January albumen appeared in the urine. The man sank from the discharge and irritation and died on February 10th. On post mortem examination a Snider bullet with a Pathan shoe nail driven into the nose of it was found lodged in the muscular tissue of the obturator internus muscle. The track of the bullet was through the right side of the sacrum obliquely downwards and outwards through the sacro-iliac synchondrosis, close along the bone over the ischial spine; it smashed the bone just internal to the right hip joint, and fell down into the substance of the obturator internus muscle.

Case IV.—A case somewhat resembling the above was that of Sarwan M. K. G. of the Commissariat and Transport. He was admitted to the Field Hospital on December 28th, 1897. He stated that he was shot between 4 and 5 a.m. from about ten yards distance. There was a round hole situated about half an inch below and two inches behind the anterior superior iliac spine on the left side. A probe passed straight in for about five inches. There was no wound of exit. On December 30th the temperature was high and he complained of a pain over the right buttock. On examination a small lump was discovered on the right side of the sacrum. An incision was made and a Martini-Henry bullet extracted. On February 20th he still had a good deal of suppuration, but was improving.

Several cases of wounds of the penis, testicles and scrotum occurred. These were treated on ordinary surgical lines, and did not call for much comment. The following case is of interest on account of the peculiarity of mode of infliction :—

Lieutenant G. E. C. was shot on November 11th. While out foraging, a bullet fired by the enemy struck the stock of his revolver which was attached in the usual manner to the belt. The bullet exploded a cartridge in his revolver, the bullet from which grooved the root of the penis about a quarter of an inch deep and passing on caused a superficial flesh wound of the left thigh. The wounds were trivial and the chief interest lies in the singularity of the case.

Wounds of the Chest.

According to the official figures there were 72 wounds of the chest during the campaign; of these 53 were penetrating and 19 non-penetrating. Wounds of the chest formed about 8 per cent. of all injuries. This closely agrees with all other campaigns during the last forty years.

Otis gives the death-rate in the American War in 20,000 wounds of the chest as 27·5 per cent. This is for all injuries of the chest, including non-penetrating wounds.

Stevenson gives the mortality from penetrating wounds of the chest as 62·5 per cent.

MacCormac gives a mortality of 54·8 per cent. for penetrating woundsof chest at Sedan and Fischer 55·8 per cent. at Metz. From these authorites it will be seen that penetrating wounds of the chest are extremely dangerous. Many of the cases do not live to come to hospital but die on the field. Chenu states according to Stevenson that 91·6 per cent. of French soldiers wounded in the Crimea in the chest died, but Longmore explains this by showing that their hospitals were so far advanced that many reached them who would otherwise have died on the field.

From the small experience obtained in this campaign, it would appear that the new small bore rifles do not produce such dangerous wounds of the chest as the rifles of larger bore. Some cases are given in which recovery was rapid after penetration of the chest by the small bore bullet. The situation as a rule is sufficient guide as to whether the bullet has penetrated or not in wounds of the new rifles; such was not the case in the days of the round bullet, which often circled round the chest; instances of this also occurred in this campaign. Wounds of the chest are divided into penetrating and non-penetrating varieties.

Non-penetrating wounds of the Chest.

These are not as a rule dangerous wounds, but owing to the difficulty of maintaining immobility of the parts they take long to heal. Some interesting examples of these were collected.

Case I.—No. 38264, Sergeant T. W., No. 8 M. B., R.A., was admitted to 13-B. British Field Hospital, on November 11th. He was out with a foraging party. While they were retiring he was struck by a bullet in the back of the chest. The force of the wound knocked him over. The wound of entrance was situated at the inner side of the angle of the right scapula, about one inch below and two inches to the inner side. The wound of exit was to the inner side of the anterior fold of the axilla. Both wounds were small and there was very little difference between the wounds of entrance and exit. He had but little shock; he felt sick, but did not vomit. There was no cough or spitting of blood, and no dyspnœa. The edges of the wound were emphysematous. The wound was diagnosed as non-penetrating, and the apertures of entrance and exit were dressed with dry pads. The bullet track healed without any suppuration. For a day or two he spat a little dark blood, but had no cough or fever. The man recovered without a bad sign and was transferred to the Base.

Case II.—Lieutenant C., Yorkshire Regiment, was lying down when he was hit from above by a bullet which entered just above the spine of the right scapula. The bullet ran over to the anterior surface, and the wound of exit was opposite the second rib just in front and internal to the shoulder. There was a good deal of ecchymosis of the shoulder; no bone or artery was touched, or the brachial plexus interfered with. Both wounds of entrance and exit were very small and the wound was evidently caused by a Lee-Metford solid bullet. Uninterrupted recovery took place. There was no rise of temperature or suppuration. The wound was firmly healed by November 13th.

Case III.—No. 1348, L. S. Thapa, 1-2nd Gurkhas, was wounded on November 22nd. He was admitted with a large ragged wound below and in the centre of the right clavicle. The bullet passed downwards and outwards, and was found protruding under the skin two inches below, and one inch to the outer side of, the angle of the right scapula. There was a great deal of shock, but no bone or important vessel was wounded. The course of the bullet was entirely extra-thoracic. The bullet was extracted and the course of the wound syringed out. He made an excellent recovery, the wound healing without suppuration.

Case IV.—Captain S., Royal Scots Fusiliers. This officer was hit on December 13th. The bullet struck the left side in the nipple line between the seventh and eighth rib. The wound of exit was about two inches below the angle of the scapula and in this line. At first perforation of the chest was feared, but no symptoms of such presented themselves, and it was evident that the bullet, presumably a round one, had run round the ribs, without causing penetration. The officer had a wound of the hand also caused by a spherical bullet. The chest wound healed well, and the case ultimately did well.

Penetrating wounds of the Chest.

The number of penetrating wounds of the chest in this campaign is given as 53. As we have already noted the question of penetration in the present day with rifles of high velocity and great penetrating power is easy, at least where a wound of entrance and exit exists. As in abdominal wounds the shock caused by penetration is usually very marked. The rapidity of breathing and pain are also well marked. The presence of blood-stained sputa, although not actually diagnostic, as this sometimes occurs in contusion of the lung, is generally present. The following are illustrative cases :—

Case I.—No. 3487, Sepoy U. S., 15th Sikhs, was wounded on November 9th. The bullet entered on the inner side of the angle of the left scapula, and emerged below the cartilage of the second rib on the left side. The wounds of entrance and exit were very small. On admission to No. 44 Native Field Hospital he was much collapsed, the pulse was hardly perceptible, and he was sick several times. He was kept under the influence of opium. The wounds were dressed with dry pads. The next day he had rallied considerably. On November 12th, four days after the wound, it was noted that he was improving. The entrance wound which was very small had closed. The left side of chest was strapped. From the attendant circumstances, it was believed that this wound was inflicted by a Dum-Dum bullet. The man made a good recovery. The wounds healed in two weeks. He was discharged from the Base Hospital on December 24th on three and-a-half months' sick furlough.

Case II.—No. 3964, Private W. G., 1st Dorset Regiment, was admitted to No. 24 British Field Hospital on November 9th with gunshot wound of the left side of chest. The bullet entered the third intercostal space, and was found posteriorly just under the skin, just below the angle of the left scapula and removed. He died shortly after admission, of shock and hæmorrhage.

Case III.—No. 2379, Havildar S. S., 15th Sikhs, was admitted to No. 44 Native Field Hospital on November 16th. He was apparently in such agony that he could only be with difficulty examined. He had urgent dyspnœa, and complained of great pain on drawing his breath. He had a most anxious and terrified expression. There were two wounds on the right side of the chest : that of entrance in the posterior axillary line on a level with the seventh rib ; that of exit much larger, two inches to the left of the right nipple. The thumb of the right hand was much smashed by a bullet, and had to be amputated at the metacarpo-phalangeal joint. He could not lie down but had to be propped up. On the next day he was much easier. He could not lie down, but the respiration was easier. No hæmoptysis. The question is whether the bullet penetrated or merely grazed the pleura. November 20th. Dressed the chest wounds to-day. No doubt the pleura has been injured, though no serious injury has been inflicted on the lung, evidenced by the easy breathing and absence of bloody sputa. Some emphysema on the front of the chest and dulness all over the right side in front and behind with indistinct respiratory sounds ; ægophony was also present. Either fluid or blood is in the pleura. The bullet must have grazed the pleura which would have accounted for his great pain on admission. The lung could not have been seriously injured. This man was seen a few weeks later at the Base, and had entirely recovered.

Case IV.—In this case a Dum-Dum bullet went through the chest ; the bullet did not "set up," and the man completely recovered. No. 3502, Private M. O'Sh., Northampton Regiment, was shot through the chest on the evening of November 9th. The wound of entrance was through the infra-spinous region of the left scapula. The bullet was removed just below the right sterno-clavicular articulation. The bullet was a Dum-Dum one, and had not expanded. There was some hæmoptysis and emphysema of the skin in the region of the scapula. Shock was present and dyspnœa. There was no welling up of blood in the mouth, or pneumothorax. The man was transferred on the eighth day after the wound to the Base Hospital. When seen there later he had completely recovered.

Case V.—No. 2867, Bugler M. G., 1-2nd Gurkhas, was hit in the back by a bullet on December 12th. The bullet entered just below the spine of the scapula on the left side. The wound of exit was opposite the outer and middle third of the left clavicle, smashing the clavicle at this part. He had urgent dyspnœa, and severe hæmoptysis. The air passed in and out of the wound with each respiration. On January 7th he was seen at the Base Hospital. The wounds had completely healed with the exception of a sinus leading down to some dead bone of the clavicle. He was well, and no trace of injury to the lung existed.

Case VI.—No. 3711, Piper M., Gordon Highlanders, was wounded on October 20th at Dargai. The bullet entered the posterior fold of the axilla, perforated the chest, and came out through the sternum, about the level of the third rib. He suffered from hæmoptysis and dyspnœa for some days. He arrived at the Base Hospital, Rawal Pindi, on November 6th, when the wounds had healed. On February 14th he was examined by the *x*-rays as he complained of some pain in the chest when he drew a long breath; nothing was discovered, and the man seems to have completely recovered.

Case VII.—No. 642, Sepoy N. D., 2nd P.I., was wounded on February 9th, 1898. The wound of entrance was in the middle line in the epigastric notch between the fifth and sixth ribs. The wound of exit was opposite and through the tenth rib, three and a-half inches from the middle line behind on the right side. He had no hæmoptysis, but had some cough. There was no pain in the liver. The temperature was slightly raised for a day or two, but soon became normal. There were no signs of peritonitis, and it was believed that the bullet passed through the base of the right lung. He made a good recovery.

Wounds of Abdomen.

Wounds of the abdomen may be classed under the headings of penetrating and non-penetrating. The diagnosis is not always so easy as it would appear to be. Shock, pain, and vomiting are often present in both kinds of injury, but in the non-penetrating variety of wounds these pass off more or less quickly, while in the penetrating variety this is not the case.

Non-penetrating Wounds.

Several illustrative cases of these injuries were met with.

Case I.—Major M., Gordon Highlanders, was wounded on October 20th at Dargai. He was hit in the left groin about one and a half inches above Poupart's ligament. There was no wound of exit, and the bullet must have dropped out. At first sight it looked as if the bullet had penetrated the abdominal cavity, but on careful examination by the finger this was found not to be the case. There was also an absence of severe shock, and the officer arrived at the dressing station smoking a cigarette. No inflammatory symptoms arose, and complete recovery followed.

Case II.—Colonel P., Oxford Light Infantry, was wounded through the abdominal walls. The injury occurred on the left side of the umbilicus, in the umbilical region. The track of the bullet was about two inches long and passed through the muscular tissue. There was only little shock or general disturbance. The peritoneum had not been touched. A mild attack of pneumonia followed the injury; otherwise this officer recovered without any bad symptoms.

Case III.—This was a more difficult case for diagnosis. Second Lieutenant O. C. S. W., 2nd Yorkshire Regiment, was wounded while on picquet on the heights above Datoi defile on November 22nd, 1897. The wound of entrance was at the upper border of the ninth rib in the anterior axillary line. The bullet travelled backwards and downwards and the wound of exit was about one inch anterior to the mid-axillary line about an inch above the brim of the pelvis. As this officer was out on a distant picquet, it was twenty-seven hours before he was brought into the Field Hospital (No. 8 British Field Hospital). A consultation was held, his condition at the time being as follows:—Temperature 101·4°, respiration 28, pulse 80; complained of no pain on deep abdominal pressure, and a firm bandage could easily be worn, and gave relief. Bowels not opened since the injury, but had opium in large quantities to relieve the pain. No retention of urine and no vomiting or hiccough. No cough or sign of injury to the pleura. It was decided that no perforation had taken place; the shock had all passed off, and the case did well.

In the Crimean War 19 per cent. of contusions and non-penetrating wounds of the abdomen died. These injuries were chiefly caused by big projectiles and fragments of such. In this campaign there were no cases of this kind, as our troops were not opposed to artillery fire.

Penetrating Wounds.

Forty-five cases are returned as having received penetrating wounds of the abdomen ; many of these were almost immediately fatal. The percentage of penetrating wounds of abdomen to wounds of other parts, was in this campaign about 5 per cent. From the success of the operation of laparotomy in civil practice, and from the writings and experiments of American surgeons, notably those of Parkes, and in our country those of MacCormac, it was hoped that in the present day, with our increased knowledge of the treatment of abdominal operations, abdominal injuries would prove much more amenable to surgical interference in the field than formerly. In this campaign the surgical treatment of penetrating wounds of the abdomen was most disappointing. The circumstances under which these operations were undertaken must be taken into consideration. It is extremely difficult in camp, or on a campaign, to perform the operation of laparotomy with complete asepsis. Clouds of dust, dirty water, lack of means of keeping the patient warm, difficulties with instruments and general want of accommodation, are all against the success of the operation. And when we add immediate movement of the patient, which is often required for military reasons, the chances against the successful performance of the operation are very great. I have no doubt that in continental warfare, in which the patient can be removed at once to a building where the operation can be performed, and subsequent movement is not necessary, the operation runs a much greater chance of success.

Most of the American and Continental military surgeons strongly advocate opening the abdominal cavity, at the earliest possible moment, in cases of penetrating gunshot wound. Stevenson also urges this course in all penetrating gunshot wounds of the abdomen "because in these cases internal lesions which cannot otherwise be repaired are certain to have occurred," and the same authority also states very truly that the only thing which can be expected in the so-called "expectant treatment" is the death of the patient. Delorme admits that the operative treatment is correct in principle, but draws attention to the extreme difficulty that must occur in warfare in its performance, and thinks that it is only in exceptional cases that it will be undertaken.

In one point all are agreed, namely, that if operation is considered advisable, the sooner it is performed the better. Stevenson states that after twelve hours the probabilities are against success, and after twenty-four it is almost useless to attempt laparotomy and suture of the intestine, for a penetrating wound of the abdomen with wound of the gut.

The mortality of penetrating wounds of the abdomen from gunshot has always been very high. In the Crimea among the French it was 91·7 per cent., among the English 92·5 per cent., and in the American War 90 per cent., and in these statistics it is doubtful if all the wounds so returned were really penetrating wounds. Coley gives for operation a death-rate of 53·8 per cent. for 39 cases operated on in the first twelve hours, and 77·2 per cent. for 22 cases operated on at a later period.

It is absolutely certain that if a bullet has entered the abdomen, wounded the intestine or some other of its contents, and consequently extravasation or hæmorrhage, probably both, have taken place, and that death will undoubtedly follow either from peritonitis or hæmorrhage unless the extravasation from the gut or bleeding is mechanically arrested, and the abdomen washed out clean. With these views it is evident that the only logical treatment of penetrating wound of the abdomen is to open the abdomen and deal directly with the wounded parts. Hæmorrhage from wounded vessels in the abdominal cavity shows no tendency to spontaneous arrest, and direct deligation is the only certain treatment. Much valuable information on these points will be found in "Stevenson's Wounds in War," in which the question is thoroughly discussed.

The notes of five cases of laparotomy for gunshot wounds of the abdomen are appended. The result was unfortunately fatal in each.

Case I.—Sepoy K. S., admitted November 25th, 1897, in the evening, suffering from gunshot wound of the abdomen. The wound of entrance was in the right hypochondrium and ran inwards; there was no wound of exit. Shock and collapse were well marked. At first there was no vomiting. While he was taking chloroform he vomited up blood clots and food. Surgeon-Captain Donovan, I.M.S., who was in charge of the case, opened the abdomen in the middle line from the xiphoid cartilage to two inches above the umbilicus. The stomach was explored, and found to be perforated by a bullet wound on the greater curvature, near the pyloric end. There was only one wound. The opening was sutured by Lembert's method with an ordinary sewing needle and fine catgut. There were no other wounds of the stomach and intestine, but in the splenic region there was some bleeding and the blood welled up from below. The source could not be traced, and as the patient was getting weak and collapsed from the operation and the unavoidable exposure to the night air, the abdominal cavity was washed out with very hot water and the abdomen closed. He rallied slightly at the time, but became collapsed two hours afterwards and died. The immediate cause of death in this case seems to have been hæmorrhage.

Case II.—(Under the care of Surgeon-Major Thompson, I.M.S., to whom I am indebted for the notes.) Driver A. S., 6th M. B., R.A., was admitted to No. 44 Native Field Hospital on November 15th with a gunshot wound below the costal arch on the right side. The wound of exit was on the right side of back, about the level of the tenth dorsal vertebra. He was in great pain on admission, with a very anxious countenance. The pulse was, however, good; there had been a great deal of bleeding externally. Blood and air were issuing from the anterior wound. It was evident that the wound was a penetrating one and preparations were made at once to perform laparotomy. An incision was made in the middle line, commencing two inches below the ensiform cartilage, and the peritoneal cavity opened for about two inches; this was afterwards prolonged another inch. The portion of the gut presenting was traced in both directions by pulling a small portion out at a time and returning it. The intestines were found distended and congested, gradually becoming less so as they were traced downwards. On tracing the intestines upwards a large rent was found in the duodenum. There were two wounds, each measuring about one inch in diameter. The edges of these were ragged and irregular. The portion of the wounded intestine was excised, the intestine on each side being compressed by the fingers. The mesentery was carefully stitched together first, and then the intestines, the latter with Lembert's sutures, about thirty being employed. The divided edges of the gut were brought closely and accurately together and the abdomen was washed out with boiled water. There was hæmorrhage from some deep source which could not be discovered owing to the distended state of the intestine. The abdominal walls were brought together with silk sutures through their whole thickness, and a drainage tube was inserted at the lower angle of the wound.

The operation took place while the 3rd Brigade, Tirah Expeditionary Force, was on a reconnaissance in the Warun Valley. The patient had to be moved the next morning and died *en route* some eight hours after the operation. It was supposed that death occurred from hæmorrhage.

Case III.—(Under the care of Surgeon-Major Grainger, I.M.S.) Syce Deen, aged about 25, was admitted to No. 43 Native Field Hospital, 10.30 a.m., on November 11th, 1897, suffering from a gunshot wound of the abdomen. The wound of entrance was on the left side between the seventh and eighth costal cartilages of the costal border. The wound of exit was behind, between the eleventh and twelfth ribs, on the left side about one inch from the anterior extremity of the twelfth rib. A small piece of omentum protruded through the posterior wound. There was slight hæmorrhage from both wounds. There was no vomiting, and collapse was not a marked symptom. There was no escape of air or gas from either wound. He was at once placed under chloroform, the anterior wound was enlarged, and a digital examination made. The bullet track was found to have passed over the edge of the costal cartilages into the abdominal cavity. An incision was made in the middle line from one inch below the xiphoid cartilage to one inch above the umbilicus. The stomach appeared congested There was very little hæmorrhage. A wound was found in the anterior wall of the stomach, not far from the œsophageal end. This was closed by five Lembert's sutures, a piece of gastrocolic omentum was double ligatured and divided; a wound was then found on the posterior wall of the stomach, this was sutured in the same way. The peritoneum around this was slightly stained by the liquid contents of the stomach. The colon was as far as possible examined. No further wound could be made out. The track of the bullet passed through the diaphragm one inch from its attachment to the ribs behind. The abdominal cavity was freely flushed with hot water after the operation, a small clot was washed out of the folds of the mesentery, and the abdominal wound closed. Iodoform and dry dressings were applied and a ⅓rd grain of morphia given hypodermically. The patient slept well after the operation and only complained of thirst in the evening. The next day he began to complain of pain in the abdomen, and during the course of the day vomited once or twice, and complained of excessive thirst. The temperature in the evening was 102°, pulse quick and hard, and his urine had to be drawn off. He lay on his back with his legs drawn up. During the night vomiting set in and he had severe pain in the abdomen and he gradually sank, death occurring from peritonitis about forty hours after the operation.

Case IV.—(Cases IV and V were under the care of Surgeon-Major Shearer, I.M.S., who performed the operations.) Muleteer Nizam Deen was wounded while foraging about two miles from camp. He was stooping down to tie up a bundle of fodder when he was struck. The bullet entered the left side of the epigastric region close to the margins of the ribs, and passed out in the right inguinal region. As the bullet had passed through the peritoneal cavity it was evident that the viscera had received injury, and preparations were at once made for the performance of laparotomy. The skin of the abdomen was carefully washed with warm water and a solution of perchloride of mercury. At first an incision about three inches long was made along the middle line; this was afterwards extended. The whole gut was systematically searched by pulling it out a little at a time and returning it. The search began at the cæcum and first went along the small intestine. The heat of the abdomen and exposed bowel were maintained as well as possible by means of towels boiled in water and kept in the vessels they were boiled in till wanted. Two perforations were found in the gut—one in the small intestine, the other in the cæcum. There was slight extravasation of fæces, and a considerable amount of hæmorrhage had taken place into the abdominal cavity. A hole large enough to admit easily the point of the fore-finger was found in the left lobe of the liver, and it was probably from this that the hæmorrhage had occurred. No other bleeding points were found. All active hæmorrhage seemed to have stopped at the time of the operation. The holes in the gut were stitched with carbolized gut and an ordinary sewing needle, the continuous suture being employed. After the injured bowel had been returned to the abdomen this was well syringed out with a solution of permanganate of potash. A large drainage tube was inserted in the wound in the inguinal region, and the abdominal walls brought together. The peritoneum was first closed separately by interrupted catgut sutures, and the other tissues by silver wire sutures. The man seemed to bear the operation well, but only lived two hours after it.

Case V.—Gunner D., No. 2 Derajat Mountain Battery. This man was wounded in the right inguinal region on November 21st. There was no wound of exit. On examination of the parts by the finger a wound of the gut was detected. A semi-lunar incision, very much resembling that employed for ligature of the external iliac artery, was made. Two wounds were found in the bowel which were carefully closed by Lembert's sutures with carbolized catgut. The intestines and abdomen were kept warm by hot cloths. The hand was introduced into the abdominal cavity and the bullet searched for, but it could not be found, being buried in the muscles. There was practically no hæmorrhage, and as the man had been for a long time (a day at least) without food, there was no extravasation of fæces from either wound. A drainage tube was introduced. As the only available water was like "pea soup" the abdomen was not flushed out. The wound was closed by bringing the peritoneum together separately, and then the rest of the tissues. During the night succeeding the operation the attendant in the tent went to sleep, and the patient got up and went outside to urinate. He was found by the hospital sergeant and brought back. Next day, twenty hours after the operation, the temperature was normal and there was only slight tenderness on pressure, but there was some blood-stained discharge. The patient died twenty-one hours after the operation, apparently from hæmorrhage, as just before death there was a copious bloody discharge. It was ascertained that he had got up again just before the bleeding set in.

A very interesting case occurred in which the abdomen was opened by a bullet, but no viscera wounded. The man recovered. I am indebted to Surgeon-Major Thompson I.M.S., for notes of the case :—Gummoo, dhoolie bearer, was wounded in the abdomen on November 11th on the march down the Bara Valley. He was seen soon after he was shot by Surgeon-Major Thompson, who found there was a wound just over the umbilicus and the omentum was protruding. The bullet had not entered the abdomen but had cut across it, severing the walls. The omentum was returned, and the parts closed, and a pad and bandage applied. He was then placed in a dhoolie. On the march the next day the kahars dropped the dhoolie he was in and ran away. As he could not stay there he got up and marched into the next camp two miles off. When seen after this he had a large protusion of omentum about the size of a closed fist. This was ligatured and cut away so as to bring the stump flush with the abdominal walls. Strong adhesions took place, he had no bad symptoms, and was transferred to the Base on December 21st. When seen at a later date, the abdomen had completely healed and there was no tendency to ventral hernia.

The following case of wound of the descending colon was peculiarly instructive. The case was treated in No. 24 British Field Hospital under the care of Surgeon - Lieutenant - Colonel Bourke, A.M.S. :—Corporal C., Gordon Highlanders, was admitted on November 10th to the Field Hospital with a gunshot wound of the back. The wound of entrance was in the right flank four inches to the right of the middle line, and just below the last rib. The wound of exit was in the mid-axillary line on the left side midway between the crest of the ilium and the last rib. The wound of exit was about the size of a rupee and ragged and blown-out looking. On the next morning a most careful examination was made. Feculent gas bubbled out of the wound of exit and the posterior surface of the descending colon was found to be wounded. His temperature was 99·8, pulse 97; he had no symptoms of collapse and no vomiting. As it was very likely that the peritoneum had not been wounded, it was thought better not to interfere by operation. Fæces were passed freely from the wound, and a sharp attack of local peritonitis occurred. Gradually the opening in the colon began to close and the fæces were passed "per anum," and eventual complete recovery took place. When seen in February, 1898, except for a little weakness of the muscles of the back, he was quite strong and well with the fæcal fistula completely healed.

The next case is one of great interest in which a man was wounded in the liver. The bullet was not extracted, but could be seen by the *x*-rays lodged in the psoas of the opposite side. Complete recovery took place.

No. 4164, Private P. McN., Royal Scots Fusiliers, was wounded on November 28th, 1897. The bullet struck him on the right side in the mid-axillary line between the eighth and ninth ribs and penetrated into the abdominal cavity. There was a good deal of hæmorrhage and the patient was much collapsed from the injury, and had a great deal of abdominal pain. There was no wound of exit. The next morning there was a considerable quantity of bile in the dressings. General peritonitis did not become developed. He was transferred on December 1st to Sadda and thence to Kohat and Rawal Pindi. He was seen at Rawal Pindi on January 26th. The wound had not quite healed. He had not suffered from peritonitis, and was doing very well. The bullet was seen by the help of Röntgen rays embedded in the psoas muscle on the right side; it gave him apparently no inconvenience. His general health was excellent, and he has now practically completely recovered.

Wounds of the Lower Extremity.

Wounds of the lower extremity were very numerous in comparison with other localities. Out of a total return of 923 wounds of all parts incurred in this campaign, 298 were wounds of the lower extremities, made up as follows :—

Wounds of the hip joint	6
" " " thigh	126
" " " knee	27
" " " leg	93
" " " ankle	8
" " " foot	36
" " " toes	2
Total ...	298

This gives a percentage of 32 per cent. to all wounds. The remarkable frequency of wounds of the lower extremities was attributable to the good shooting of the enemy, many of whom had been in our service unfortunately and had been taught to fire low. Only six cases of wounds of the hip joint were returned as such in the official list of wounded. The difficulty of diagnosis in this injury is very great. The motions of the joint may remain perfect after gunshot injury of the joint, and patients have been known to walk for days before the real injury became apparent. Gunshot wound of the hip joint has always been among the most fatal injuries in military surgery, but with the advance of aseptic surgery we may confidently look forward to more encouraging results. Considering the large mortality from primary amputation and excision, it is certain that conservative surgery of the part will recommend itself to the surgeon in the majority of cases. Otis gives the following mortality for amputation at all periods, viz., 91·2 per cent. The same authority gives the following statistics for excision : for primary excision 93 per cent., for intermediate 96 per cent., and for secondary excision 63·4 per cent. Langenbeck states that 31 cases of excision of the hip joint were performed in the Franco-German War with 26 deaths or a mortality of 83 per cent., while among 88 cases treated conservatively 25 recovered, or a mortality of 71·5 per cent. Exploration of the wound will be required in most cases, and a consideration of the track taken by a careful study of the wounds of entrance and exit. The key-note of successful conservative surgery is the maintenance of asepsis, free drainage and immobilization of the joint.

One case only of wound of the hip joint came under my notice. It was very instructive. No. 3108, Lance-Corporal W. C., 1st Northampton Regiment, was wounded at the taking of the Sampagha Pass on the 28th October. The wound of entrance was half an inch in front and a little above the great trochanter. The wound of exit was on the inner side of thigh close to the perineum. The bullet in its passage had grazed and partially fractured the anterior surface of the femur. On November 25th it was noted that the wound of exit had healed, but that there was a good deal of discharge from the entrance wound, and bare bone could be felt on the anterior surface of the femur by the probe. There did not appear to have been much immediate damage to the femur, as he was able to walk after the wound. Pus formed all around the track of the bullet and numerous abscesses required opening. He went from bad to worse, and died of exhaustion on February 26th, 1898. At the post mortem examination, two hours after death, the track of the bullet was found in front of the great trochanter and immediately below it, passing across the anterior surface of the femur above the anterior inter-trochanteric line, and ending on the inner side of the thigh near the scrotum. The bullet had evidently opened the capsule of the hip joint in its passage. The acetabulum was full of pus and the bone carious. The head of the femur was also carious. A large abscess was present on the inner side of the ischium, which communicated with the acetabular cavity. Sinuses led under Poupart's ligament into the pelvis. On the anterior surface of the femur a distinct groove caused by the bullet was present. The track of this was carious.

A large number of cases of gunshot wounds of the shaft of the femur were treated during this campaign. It was a most noticeable fact that those men who were wounded at Dargai, Karappa, Maidan, and Bagh, and who had to come down the long line of communication, and were subjected to much movement, did not do so well after gunshot wound of the thigh as the men who were wounded in the Bara Valley and Khyber, and who came down a shorter line of communication. In many of the former cases, secondary amputation had to be performed on account of the profuse suppuration that became established. The operation of secondary amputation of the thigh proved very successful.

The mortality for amputation of the thigh for gunshot wounds of the femur in the American War was as follows (Stevenson):—

Upper third	73·3	per cent.
Middle „	55·3	„
Lower „	45·0	„

The mortality for all primary operations through the femur was 49·8 per cent., intermediate 63·7 per cent., and secondary 45·9 per cent. It will be noted, therefore, that secondary amputation of the thigh gives a lesser mortality than primary amputation. The question as to which treatment to adopt, conservatism or amputation of the thigh for gunshot wound, will always be a difficult question to decide, and will depend on many points. In the first place will the patient have to be moved at once, and if so, by what form of transport? We have seen that the movement down a long line of communication in this campaign was attended with bad results, and that such cases as a rule required secondary amputation. Although secondary amputation, compared with primary amputation, is a successful operation, yet we must remember that in the case of secondary amputations suppuration has generally taken place, and consequently the tissues of the flap have become septic in character, a circumstance which adds greatly to the risk of the operation. On the other hand, the difficulties which surround aseptic operations in the field must not be lost sight of.

It was noticed in most of the cases in which amputation was necessary, that a sequestrum formed by a necrosed fragment of bone was present. The callus had been deposited around this, quite preventing its exit by natural means. This should emphasize the fact, that it is of the utmost importance to remove all loose fragments of bone in those cases in which we attempt a conservative method of treatment, and that if the patient is suffering from profuse discharge, the early removal of an offending sequestrum may save the limb. If left, these fragments serve as irritative bodies. Our own opinion is that if the gunshot wound is of a very severe nature, with great fragmentation and splintering, and the patient is to be moved at once down a long line of communications, and the fracture is of the lower two-thirds, we best consult the safety of the patient by primary amputation.

The following cases are of interest: —

Case I.—Postmaster E. R. was wounded while cleaning his own revolver in Bagh early in December. The wound of entrance was in the middle and inner side of the left thigh, the wound of exit on the outer side of the thigh, just above the knee, and the bullet had opened the upper part of the synovial pouch. The bullet had not really caused a wound of exit as it lay just below the skin and was removed. A good deal of hæmorrhage was present and the bone of the lower third of the left thigh was fractured. On his admission to the Base Hospital, Rawal Pindi, suppuration had become established and ultimately abscesses formed in various parts of the thigh. The femur seemed to have united, but the suppuration continued profuse, and the patient's general health suffered severely. On March 6th, as pus was again collecting in the upper part of the thigh and the patient was losing ground, it was decided to remove the limb, and the limb was amputated in the middle third by the modified circular method by Surgeon-Lieutenant Fleury, A.M.S. On examination of the bone after amputation, callus was found to have been thrown out in large quantities from each end of the bone. The two ends of the bone were kept together by a ring of bone as by a ferrule. The shaft of the bone had not united in its continuity. The lower fragment was rather obliquely placed. In a large cavity in the callus was a sequestrum. This was firmly fixed in the callus and could not be moved. The sequestrum was evidently formed by a loose fragment which had been left.

Case II.—Private T., Devonshire Regiment, was wounded on November 25th, 1897, at Karappa. The wound of entrance was situated at the anterior and outer part of the thigh, at the junction of the lower and middle thirds. There was no wound of exit. The position of the bullet could not be determined. The femur was fractured in the middle third. The wound was explored by the finger and a piece of loose bone removed and drainage tube inserted. On December 12th, the wound was enlarged and numerous pieces of dead bone removed. The discharge, however, still continued profuse and several collections occurred, which had to be opened and drained. On January 19th, as the patient was getting into a very low condition, it was decided to amputate the thigh; this was done by Surgeon-Captain Bray, A.M.S., at the junction of the upper and middle thirds. On examination of the bone after removal, a sequestrum was found in the shaft of the femur; the fractured ends were united by callus. The amputation flaps were very œdematous and sodden. One month afterwards he had profuse secondary hæmorrhage, and as pressure did not stop it, the superficial femoral artery was ligatured. There was no return of the hæmorrhage, but he died of exhaustion twenty-four hours afterwards. He had also at the time of his death phlebitis of the right femoral vein, and swelling of the right knee joint. On examination of the joint after death, the fluid was found to be synovial, and no secondary abscesses had formed.

Case III.—No. 3771, Private M., Gordon Highlanders, was wounded at Dargai, October 18th. While lying down firing, the bullet hit him on the posterior surface of the lower third of the thigh, passing through and fracturing the lower third of the femur, and passing out on the anterior surface of the thigh at a slightly lower level than that of entry. He was transferred to the Base Hospital, Rawal Pindi, on December 23rd, and at this time the wound of exit had quite healed, but there was a profuse discharge from the wound of entry, and apparently there were some loose fragments of bone causing irritation. A large amount of callus had been thrown out round the seat of fracture. On December 30th, as the discharge continued profuse and the patient was losing ground, chloroform was administered, and on examination the femur was found extensively fractured. There was no attempt at union. Amputation was therefore performed in the upper third of the thigh. Numerous fragments of bone were lying loose and these, along with the fragments of the bullet and the clay plug of a Snider bullet, were removed from the tissues. The amputation wound healed well and the man was invalided to England.

Private K., Gordon Highlanders, was wounded in the Warun Valley on November 15th. While lying down firing the bullet struck him at the back of the lower third of the thigh, fracturing the left femur and passing out on the inner side close above the internal condyle, slightly grazing the skin of the lower part of the right knee. He was transferred to the Base Hospital, Rawal Pindi, on December 23rd, when it was noted that the wound of entrance had nearly healed, but that a foul discharge was coming from the wound of exit. There was a large amount of callus thrown out around the fracture. On December 27th a thorough examination of the wound was made under chloroform, large splinters of the femur were removed, and as there seemed no probability of good union, amputation of the thigh through the middle third was performed. On examination of the limb after removal there was no attempt at union. A large amount of callus had been thrown out from the lower fragment of the fractured bone but none whatever from the upper fragment. The whole of the lower fragment above the condyle was completely smashed up. The patient made a good recovery and proceeded to England.

Case IV.—Sergeant L., Northampton Regiment, was admitted on 9th November, 1897, with a gunshot wound of the left thigh. The wound of entrance was about an inch above the left patella, in the centre of the thigh; the direction of the wound was directly backward, and the wound of exit was a large wound, situated at the back of the thigh at the upper part of the popliteal space. The bone was much shattered and the knee-joint probably fissured into. The parts were well cleansed, having become foul in transit, and the limb placed on a long splint The wound was septic, and very considerable traumatic fever occurred. Secondary amputation was performed on November 30th, and the case made an excellent recovery.

Case V.—Is a very interesting case of gunshot wound and fracture of the upper third of the femur reported by Surgeon-Lieutenant-Colonel Hamilton, I.M.S., from Shinowrie, and it shows the admirable results which can be obtained in certain cases by conservative surgery.

A sepoy was admitted to No. 42 Native Field Hospital with a bullet wound of the thigh. The bullet had entered near the junction of the great trochanter, neck, and shaft of the right femur and came out at a lower level near Hunter's canal. The femur was completely smashed in its upper third. He was put up in a long splint, but owing to his restlessness it was found extremely hard to keep the leg straight and in spite of every warning he would sit up; this led to more deformity than there might otherwise have been, but in no way interfered with the healing of the wound, which pursued an aseptic course without the formation of a drop of pus. Within twenty days the fracture was practically a simple one, the only indications of injury of the soft parts being a small hard scab at the wounds of entrance and exit. There was very little pain after the first few days. On the 28th day the limb was taken off the splint, and on examination it was found to have united firmly; he was then sent to the base. When seen at the base hospital the wounds were completely healed and the femur consolidated. There was a good deal of deformity of the thigh. He could bear his full weight on the limb. There was some shortening.

Case VI.—No. 4259, Private W., Dorset Regiment, was wounded on 8th December just below the groin on the right side. The bullet passed downwards and backwards fracturing the upper third of the right femur. There was no wound of exit. He was placed on a long splint and sent to the Base Hospital at Nowshera. On January 6th, 1898, he was doing very well. The wound had practically healed and the fracture converted into a simple one. He was treated with extension and a long splint. There was a good deal of callus thrown out. On February 2nd the fracture had consolidated; there was some deformity, and about two inches shortening.

Case VII.—Was also a case treated by conservative method with good result. No. 3726, Corporal H., Gordon Highlanders, was wounded on December 12th at Saragarev, Bara Valley. The bullet struck him in the middle third of the right thigh, smashing the femur in this position. There was a good deal of comminution of the fragments. The bullet was ultimately found in the thigh and removed. He was placed on a long splint and sent to the Base Hospital, Nowshera. On January 6th the limb was in good position on a long splint, some suppuration had occurred, no bone had come out, and he was doing well. On February 2nd he was noted as doing well, and made a good recovery.

Case VIII.—Also a case of gunshot wound of thigh with fracture of femur; treated conservatively with recovery. Private J., K.O.S.B., was wounded on December 13th. The bullet entered in the middle third of the thigh behind and internally. The wound of exit was in front and to the outer side of the middle of the thigh. He was treated at Nowshera by long splint and extension by weight. On January 6th he was noted as doing very well. Very little suppuration and no fever. On February 2nd there was still a little discharge but no fever. A good deal of callus was thrown out and the wound had nearly healed.

Case IX.—Another example of successful conservative surgery in fracture of thigh from gunshot wound. No. 4055, Private I. M., K.O.S.B., was wounded on December 13th. The bullet entered at the junction of middle and lower thirds at the inner side of the thigh and passing across at the same level to the outer side fractured the thigh at the junction of middle and lower third. The entrance and exit wounds were small Treated with a long Liston splint and weight at the Base Hospital, Nowshera. The discharge gradually stopped and consolidation of fracture took place. He was seen in Murree in May. The fracture had quite united and the leg was strong. There were three inches of shortening. A great deal of callus thrown out.

A large number of cases occurred in which the bone was not injured. These as a rule did well.

Case I.—Rifleman K. T., 1-2nd Gurkhas, was wounded at Dargai on October 18th. The bullet entered near the anterior border of the left vastus internus and came out by its posterior border. No pus formed. The case was transferred to the base on October 24th, and was discharged quite cured to his depôt on November 19th fit for duty.

Case II.—No. 3695, Private H. P., Northampton Regiment, was wounded through the middle of his left thigh. The wound of entrance was on the posterior surface of the thigh, and of exit on the anterior surface. The wound healed without suppuration.

Case III.—Jemadar M. S., 15th Sikhs, received a flesh wound through the fleshy part of the right thigh on November 9th. The wound was on the outer side of the thigh; the wounds of entrance and exit were very small. The bullet was evidently a Lee-Metford bullet. The wound healed at once without suppuration.

The following case is one of much interest; it shows that on using a limb in which a bullet is retained the bullet may shift its position considerably:—

Case IV.—Lieutenant F., Dorset Regiment, was shot on the evening of November 10th, while on picquet duty. The bullet entered the right thigh at the junction of the middle and lower thirds. The bone was not implicated. The wound progressed favourably and healed without suppuration and at once. The bullet could not be found and remained in the thigh. The Röntgen rays showed the bullet apparently as a sphere about three inches below the original wound, and one inch from the femur. As there was no pain or any disturbance the patient was told to walk about, and was subsequently again examined with the *x*-rays about three weeks after the first examination with them, when it was found that the bullet had moved up about eight inches. There was no abscess or any local inflammation. It was now found that the bullet (which was a Martini-Henry) had moved not only upwards but had turned on its axis and what had before appeared as a spherical bullet was now seen as a cylindrico-conoidal bullet, which was giving no pain, was not removed, and this officer was invalided home for causes other than his wound.

Case V.—In this case wound of the soft parts of the thigh was complicated by severe hæmorrhage which was arrested by pressure. A Sikh was shot through the thigh, the bullet entering on the posterior surface of the thigh, just below the fold of the buttock, and passing out in front on the outer side of the middle of the thigh. Hæmorrhage was profuse, and the man a good deal collapsed. On admission the course of the bullet seemed to be in front of the femur, and below and external to the femoral artery. Pressure stopped the hæmorrhage. The man was in a critical condition for some days, but ultimately made a good recovery.

Case VI.—In this case the artery was actually exposed without any injury to the vessel. No. 41181, Private E. C., Royal West Surrey Regiment, was hit by a bullet in the upper part of Scarpa's triangle of the right leg; the course of the bullet was outwards and somewhat downwards, making its exit by the great trochanter. This wound ran across the course of the artery. The superficial femoral artery was exposed, and could be seen pulsating in the depth of the wound.

Case VII.—Was another wound which was very close to the main vessels of the thigh. Havildar M. R. R., 1-2nd Gurkhas, was struck by a bullet in the right buttock. The wound of exit was to the inner side of the femoral vessels, in front of the thigh. The wounds of entrance and exit were small and healed at once.

Case VIII.—Was a very interesting case in which the vessels were involved and gangrene supervened. No. 1907, Private G., Royal Scots Fusiliers, was struck by a bullet, probably a solid Lee-Metford, on December 13th. The bullet entered at the back of the left thigh just below the level of the great trochanter. The bullet went through the thigh, emerging on the anterior surface of the thigh, just internal to the line of the vessels, which apparently was touched. There was a great deal of venous hæmorrhage at the time, but the wound healed speedily. A good deal of œdema, however, remained in the leg and foot, and on further examination the femoral vein was found to be plugged. Gangrene of the toes and sole of the right foot followed, and when the line of demarcation formed, the toes were amputated, but at that time it was still doubtful how far the process really extended, as the skin of the leg was not healthy and bullæ formed on the front of the leg. It was questionable if the gangrene was altogether due to the plugging of the vein or to cold. He was exposed to great cold on the night of the 13th December, on which day he was wounded, and did not arrive in camp till late, and was then very wet and cold. This case eventually did well, and no further operation was necessary.

Case IX.—Is a very instructive case, demonstrating the great value of Röntgen rays in the detection of a bullet and also how easily a bullet may be overlooked without them, also the bad effect of a piece of clothing in the wound. For the notes I am indebted to Surgeon-Major Dawson, I.M.S. Sepoy B. S., 36th Sikhs, was wounded in the rear guard action returning from Datoi on November 24th. On examination it was found that he had a gunshot wound on the outer side of the right thigh at the junction of the upper and middle thirds. There was no wound of exit. The bullet could not be felt and the probe only passed in about an inch. The bone was not fractured. The next morning he was placed under chloroform and a thorough exploration made. It was found that a small slit had been made in the ilio-tibial band of the fascia lata and that beyond this no passage could be found. The probe, however, passed for a short distance either up or down the leg, evidently between the muscles. No bullet could be discovered, and it therefore seemed probable that the bullet might only have penetrated a little way and then dropped out of the wound of entrance. The next day as he had considerable pain and rise of temperature he was examined by Surgeon-Major Beevor with the Röntgen rays, and the bullet was very distinctly seen and localised. It had passed deeply into the thigh and was situated nearer the bone than the skin, slightly to the nearer side of the thigh and an inch above the level of the wound of entrance. He was placed under the influence of chloroform, and knowing the situation of the bullet and the course it had probably taken, the track was again searched by means of a probe but the bullet could not be felt. A passage was then made from the wound of entrance in the direction of the bullet but still failed to reach it. The bullet was then cut down on, from the back of the thigh; a soft mass was felt embedded in the muscular tissues, on removing which it proved to be the bullet rolled completely up in a piece of the *poshteen* the man was wearing at the time. This material was saturated with pus and very offensive. The effect of the bullet being rolled up in the *poshteen* was that the probe did not strike the bullet and the mass seemed soft and unlike a bullet. This was a very instructive case and had not the Röntgen rays undeniably demonstrated the presence of the bullet it might have been overlooked for some time. Early in January the wound had completely healed.

Gunshot wounds of the Knee-joint.

The number of cases of wounds of the knee-joint in this campaign is recorded as 27: this gives a percentage of 3 per cent. to wounds of all parts: this agrees with the statistics of other campaigns.

Wounds of the knee-joint are especially liable to give trouble on account of their great tendency to become septic and to undergo dangerous inflammation. At one period in military history amputation of the thigh was the invariable rule in gunshot wounds of the knee-joint. The mortality of this operation for wounds of the knee-joint is given as 53·6 per cent. Many authorities, Stromeyer and Langenbeck among the number, have denied that a bullet can pass through the knee-joint without fracturing the bones, but it is now admitted that such an accident may occur, especially with the small bore projectiles. Dr. Dugald Christie in the *British Medical Journal* of April 13th, 1895, records the case of a Chinaman hit by a bullet from the Murata rifle of ·315 calibre. The bullet passed through the knee joint near its centre. The man had to travel 200 miles but the wounds healed without a bad symptom. One such case came under observation during this campaign. Sepoy I. S., Jhind Infantry, was in a sitting position for firing.

He was hit in the left knee-joint. The bullet, probably a Lee-Metford, passed through the knee-joint. The wound of entrance was just outside the patella: the bullet passed straight through emerging behind in the popliteal space. The leg was placed on a back splint and the wound healed at once without trouble and there was no impairment of motion.

The treatment of wound of the knee-joint with comminution of the fragments must come under one of three methods of treatment—amputation of the thigh, excision of the knee, or conservatism. As regards amputation of the thigh this course should, I think, be followed if there is extensive shattering of the knee-joint and the patient has to be moved down a long line of communications. According to military writers the operation of amputation of the thigh for wound of the knee-joint has not been encouraging; in the Crimea the mortality was 90 per cent., 76·8 in Italy, 55·1 per cent. in America, according to Otis, and 59 per cent. in the war of 1870 (Stevenson). In spite of these figures of former campaigns we hold that amputation in the present day is a much more favourable operation than in the days when these statistics were compiled. Excision of the knee-joint is not an operation which has found favour with military surgeons. Sir William MacCormac states "that excision may be performed in civil practice but is not justifiable in military," and Otis remarks that it should only be done in war when the patient refuses amputation. Numerous other writers support these ideas. On the other hand, Delorme, Langenbeck and other continental surgeons of note think that good results have been obtained by this operation. One case of excision of the knee was performed during this campaign, and although successful as far as life was concerned, did not result successfully. The notes of the case will be given.

Conservative surgery, which is applicable to a large number of cases in those who can be kept at absolute rest, is by no means to be always recommended in campaigns like the present, in which the wounded had to be moved daily for many days.

Some illustrative cases with reference to the above remarks are given:—

Case I.—No. 3601, Sepoy H. S., 15th Sikhs, was admitted on November 16th to No. 44 Native Field Hospital with gunshot wound of the left leg. The entrance wound was to the outer and posterior side of the head of the left fibula, and that of exit below and behind the external condyle of the femur. There was a good deal of oozing from both wounds, which had to be plugged by antiseptic lint. There was no evidence at the time of injury to the knee-joint, except the direction. Three days afterwards, the left knee-joint became much swollen and œdematous, and felt boggy. The patient's temperature was high and his condition serious. The parts were thoroughly examined under chloroform, and it was found that the internal condyle of the femur was much splintered. The femur was intact. As there was no longer any doubt that the joint was opened, Surgeon-Major Thompson amputated through the knee-joint, by anterior and posterior skin flaps, taking away the patella. The case was transferred to the base and was believed to have done well.

Case II.—In this case, the fracture extended into the knee-joint. The patient nearly lost his life from sepsis.

Colour-Sergeant C., K.O.S.B., was hit on December 13th. The bullet entered on the outer side of the right knee just below the knee-joint, fracturing the upper part of both tibia and fibula, and probably fissuring into the knee-joint. The wound of exit was about an inch below the knee-joint on the inner side. On January 7th the wound was noted as suppurating freely, the knee-joint was much swollen, and the leg and thigh very œdematous. His temperature was high, and he seemed in a very precarious condition. A large collection of pus had formed below the deep fascia of the thigh, and pus was also collected among the planes of the muscles of the leg. Free incisions were necessary. The knee-joint had also to be drained. On February 2nd he had greatly improved and had no fever. Subsequently other abscesses formed and required opening. He, however, recovered. The knee was ankylosed and his health much impaired. At one time it seemed very probable he would lose his life. No doubt amputation in the first instance would have given a more satisfactory result.

Case III.—Excision of the knee-joint.

Private C., K.O.S.B., was shot in the right knee-joint on November 22nd outside Bagh. The bullet entered the front of the knee-joint and lodged in the joint. There was a good deal of suppuration about and in the joint, and excision was performed on December 9th. On admission to No. 1 British Base Hospital at Rawal Pindi, the patient was much emaciated and had bed sores on the bony prominences of the back. The operation wound had healed except for three sinuses which did not appear to lead down to dead bone. The union was only fibrous, and distinct antero-posterior movement was present. He had not used the leg which had been kept immobile. It is doubtful if secondary amputation will not be required. He was put in plaster of paris and sent to England for further treatment.

Gunshot wounds of the Leg.

In fractures of the leg, conservatism should be attempted. In the American War with septic wounds the mortality was only 13·8 per cent., under modern aseptic treatment this should be much less. In former times the majority of army surgeons advocated amputation of the leg, if both bones were extensively fractured. Now such a procedure would only be followed if the main arteries and nerves have been severed. Especially is this the case if the posterior tibial artery has been injured, and owing to the proximity of the nerve, this is almost certain to be implicated in this condition.

Several cases of fracture of the bones of the leg from gunshot wound were treated by conservative methods, and although in some cases the treatment extended over a long period, in the end most of them did well. Some of the more interesting cases are related.

Case I.—Lieutenant P., Cameronians, was hit in the middle third of the left leg on October 18th. The bullet entered the fleshy part of the calf, in the middle of the posterior surface of the left leg. There was no wound of exit. The next morning he was placed under chloroform that a thorough examination might be made and the course of treatment decided on. Surgeon-Major O. Keeffe, who was in charge of the case, enlarged the entrance wound, and on examination found the tibia much shattered in the middle third. The splinters were large, and all adherent to the periosteum and soft parts. The bullet could not be found. An incision was made over the seat of fracture in front to see if the bullet had passed through to the front of the leg, but it could not be discovered. In spite of the great fracturing of the bone, the main arteries and nerves were intact, and it was decided to treat the injury conservatively. The leg was therefore dressed antiseptically and placed on a splint.

January 1st.—It was noted that there was still a good deal of suppuration, and that the bullet had been discovered by the help of the Röntgen rays. On January 19th the bullet was removed; it was lying in the muscle some way from the original wound. The leg was consolidating. He was ultimately sent to England and was doing well.

Case II.—No. 2683, Lance Naique H. S., 15th Sikhs, sustained a fracture of both bones of the leg from a gunshot wound. The bullet entered the left leg three inches above the ankle joint and passed through to the opposite side. The wound of exit was much lacerated and the soft parts a good deal torn and injured. As the large vessels and nerves were uninjured it was decided to attempt conservatism, and the leg was put up in plaster of paris with windows for the dressings. The leg was previously wrapped with layers of cotton wool to prevent undue pressure. Several loose pieces of bone required removal. On the 6th day he was transferred to the base and did well.

Case III.—Sepoy I. S, 15th Sikhs, received a severe wound of the leg. There was a small wound of entrance in front of the left leg about four inches above the ankle, and a very large wound of exit on the posterior surface of the leg, measuring three inches by four. The muscles were much lacerated and hanging out of the wound; the tibia was fractured but not the fibula. A few splinters of loose bone were removed and the limb dressed with a dry antiseptic dressing and placed on a splint. Free oozing occurred which necessitated the dressing being taken off a few hours afterwards. A small vessel was found to be bleeding and was ligatured. The wound was redressed. He went on well; was transferred to the base on the third day, and did well.

Case IV.—This case is reported by Surgeon-Lieutenant-Colonel Hamilton, I.M.S., from Shinowrie. Non-union took place from necrosis of the ends of the bone. The bullet, most likely a Snider, entered at the lower border of the left calf and passed forward, fracturing and splintering the tibia. On dressing the patient on the 21st October it was found that profuse suppuration was taking place; pus could be squeezed out from under the skin around the wound. The whole leg was greatly swollen and there was a good deal of swelling of the knee and ankle-joint. There was no scurvy or any constitutional taint, and no history of the wound being fouled in any way to account for this condition of affairs. The field dressing had been applied soon after the receipt of the wound in the usual way. The wound was thoroughly washed out with antiseptic lotion and placed on a side splint. It was carefully irrigated twice a day and free drainage maintained. The suppuration did not diminish to any appreciable extent. At the beginning of the fourth week chloroform was administered and the parts thoroughly examined. There was absolutely no callus thrown out and the ends of the bone were rough and apparently dead. Amputation was advised, but the patient objected to it at this time. The medical officer in charge of the case says, "it is hard to explain the suppuration and failure of union—it was such a marked contrast to other cases."

Wounds involving the fibula only do not call for much remark. Immobilization and antiseptic dressings as a rule caused a rapid recovery without loss of function.

Case I.—In this case the wound of exit was very large. A sepoy was hit at the junction of middle and lower thirds of the right fibula; the bone was much smashed and a very large exit wound existed on the posterior aspect of the leg. The skin was burst open in three parallel lines and the muscles protruding. There was also a separate wound behind the leg to the inner side. He was dressed with dry antiseptic dressings and placed on a splint. He did well and made a good recovery.

Case II.—A protracted recovery after gunshot wound of the fibula. Private G. P., K.O.S.B., was shot on 21st November while going on picquet. The wound of entrance was in the middle third of the leg on the anterior aspect on the outer side. The entrance wound was small, probably caused by a Martini-Henry bullet. The bullet passed directly backwards and out behind, fracturing the fibula in the middle third. The wound of exit was also small and not fissured. He was placed on a side splint after the wound had been dressed with dry antiseptic pads. When redressed two days afterwards there was no sign of an inflammation about the wound and he was doing well. He was transferred to the Base. On January 10th, however, the wound was still open and discharging.

Gunshot wounds of the Ankle-joint.

Injuries of the ankle, the result of gunshot wounds, were formerly considered severe enough to warrant amputation; now with improved methods of treatment, conservatism will certainly suggest itself as a substitute. Of 518 cases of injury to the ankle-joint treated conservatively in the American War the mortality was 19·5 per cent. The mortality for primary amputation in the same war was 25·1 per cent. and for secondary amputation 7·7 per cent. In any case it seems better to attempt conservative treatment as if this is unsuccessful the mortality for secondary amputation is very small. A formal excision of the joint is not a successful operation in military surgery; the mortality from excision is greater than that from amputation, and as Stevenson remarks, "the functions of the foot are so badly performed after excision that walking with an artificial substitute after amputation is easier." If excision is performed it seems better to use the gouge for the removal of the shattered bone and not to formally excise the joint. In one case the result of conservative treatment was very successful.

Case I.—No. 4897, Sepoy T., 2nd Punjab Infantry, was hit on December 11th in the right ankle; the bullet went through the joint. It entered at the tendo-Achilles behind and came out in front in the centre of the bend of the ankle. The wound healed at once without suppuration or trouble of any kind. On January 7th the motion of the joint was good and the wound firmly healed.

In another case conservative treatment was not so successful.

Case II.—No. 25, Colour-Sergeant I. H., Northampton Regiment, received a bullet wound through the left ankle on November 9th. The bullet was probably a Martini-Henry. It entered just in front and below the internal malleolus and came out on the outer side of the ankle just in front of the external malleolus. Some pulverised bone was removed from the external wound. No operative measures were undertaken at first, and the wound appeared healing well without suppuration. On January 10th he was still under treatment. Suppuration had occurred in the joint, which was a good deal swollen and inflamed. Some dead bone could be felt. A few days later the head of the astragalus and parts of the scaphoid and cuboid bones were removed by the gouge. The case did not do well, and amputation was necessary through the lower third of the leg. The case eventually did well.

In the following case secondary amputation of the leg was required for wound of the ankle-joint:

Case III.—No. 3329, Private W. A., Northampton Regiment, was shot in the left leg at Saran Sar on November 9th. The bullet entered immediately above the left heel and came out in front of the leg above the ankle-joint. In its course the ankle-joint was opened and both bones of the leg were completely smashed in the lower third. From the first the limb did not do well. On November 21st the wounds were enlarged, all pieces of loose bone removed, and openings made for free drainage. The leg, however, went from bad to worse, and, as the patient's health was suffering considerably, secondary amputation of the leg at the seat of election was performed by Surgeon-Major Winter. The man made a good recovery.

CONCLUSION.

In conclusion I should like to draw attention to the success of the surgery of this campaign taken as a whole. The wounds as a rule healed readily and with little suppuration. As far as I can ascertain not a single case of tetanus or pyæmia occurred. This is, no doubt, due to a thorough appreciation of the value of asepis in the treatment of wounds. The major operations were almost uniformly successful. I am unable to give a completed list of these, but no doubt information on this point will be supplied and will be most interesting. I am indebted to many medical officers of both services for the notes of cases from which this report has been compiled, and especially to the courtesy of Brigade-Surgeon-Lieutenant-Colonel Ring, Surgeon-Lieutenant-Colonels Palmer and Haig, and Surgeon-Major Flanagan for their kindness in allowing me to complete my notes in the Base Hospitals of which they were severally in charge at Rawal Pindi and Nowshera.

I have to thank Surgeon-Colonel Stevenson, Professor of Military Surgery, Netley, for much valuable information from his book, "Wounds in War," from which the statistics for comparison are mostly taken.

It was intended that a series of radiagraphs taken with the "Röntgen Rays" should form part of this report and serve to illustrate some of the cases. These are at present unfortunately not available.

APPENDIX No. VIII.

REPORT ON A SEVERE OUTBREAK OF ENTERIC FEVER IN QUETTA DURING THE YEAR 1896. (With one Chart.)

By Surgeon-Captain F. R. **Newland**, M.B., Army Medical Staff.

During the year 1896, Quetta was visited by an exceptionally severe outbreak of enteric fever. The strength of the European garrison was 2,300, and between the 3rd of April and the 1st of December there were 141 cases admitted to the station hospital. All these cases were under my sole care, and I gave the cold bath treatment a more extensive trial than I think has ever been previously done in India. My opportunities were exceptional, for it rarely falls to the lot of one medical officer to have the immediate care of such a large number of cases.

Etiology.—The year 1896 was an exceptionally hard one for the rank and file of the garrison. Field days were much more numerous than is usual in the hot weather. On many occasions the men did not get back to barracks until past 10 a.m., having been out for some four hours marching and manœuvring all the time. Many of them became exhausted and in no fit condition to stand the fatigue of marching in the hot sun. They fell out of the ranks in numbers, and drank any water they could get—principally from irrigation channels. Fatigue and exposure to the sun are very common predisposing causes of enteric fever in India, for they increase the susceptibility to the specific germ and lower the existing power, and I think it is the experience of medical officers in India that the less young soldiers are worked in the sun in the hot weather, not only will they be the more fit for work in the cold weather, but, also, both enteric and malarial fevers will proportionately decrease.

Age and recent arrival in India.—This predisposing cause was especially well marked in this epidemic, and is very clearly shown in the accompanying table. From this it will be seen that 70·92 per cent. of the cases were between the ages of 20 and 25, and that 69·50 per cent. had less than 3 years' total service in India.

Ages of the Enteric Cases.

	Under 20 years of age.	Between 20 and 25 years.	Between 25 and 30 years.	Between 30 and 35 years.	Over 35 years.
No. of cases ..	2	100	35	4	0
Percentage ..	1·42	70·92	24·82	2·84	0

Service in India of the cases of Enteric Fev.r.

	Under 1 year.	Between 1 and 2 years.	Between 2 and 3 years.	Between 3 and 4 years.	Between 4 and 5 years.	Between 5 and 6 years.	Between 6 and 7 years.	Between 7 and 8 years.	Between 8 and 9 years.	Between 9 and 10 years.	Over 10 years.
No. of cases..	50	23	24	20	6	7	8	1	0	1	0
Percentage..	35·46	17·02	17·02	14·19	4·26	4·96	5·67	·71	0	·71	0

Water supply.—Though the water supply is almost as perfect as it is possible to conceive, yet its contamination was the direct cause of the outbreak. Samples drawn from different sources were sent to Mr. Hankin, the Government bacteriologist, for examination, and the enteric bacillus was found by him in several of those. Though cases were very generally distributed throughout the garrison, yet the artillery suffered most in proportion to their strength. This is easily accounted for, as Mr. Hankin found large numbers of bacilli in a sample of the soda-water drawn from the Royal Artillery mineral water factory. He also found it in the water drawn from some of the cantonment hydrants, but not in others. It was impossible to trace how the water supply became contaminated—for it is brought into Quetta for a distance of 13 miles from a pure source amongst almost uninhabited mountains, 1,400 feet above Quetta. That it was contaminated by natives is of course possible, and lately several papers have appeared, written by officers in the Indian Medical Service, proving the fact that natives do frequently suffer from enteric fever. Surgeon-Captain Buchanan, the Superintendent of the Nagpur Central Jail, tells me that recently he has had several cases of undoubted enteric fever among the native prisoners. One of these cases died, and at the post mortem examination typical enteric lesions were found. This being so, it is not difficult to understand how the water supplies of large cantonments such as Quetta become polluted.

Native city and bazar.—The filthy insanitary state of the native city of Quetta may no doubt be responsible for some of the cases. It is full of brothels and drinking shops, and is crowded with soldiers daily. But I do not for one moment believe that it was responsible for this severe outbreak. The condition of the city was no worse last year than it has been for many years past, nor have the habits of the British soldier altered. An exceptionally severe outbreak, such as this has been, points to some extensive pollution of the drinking water.

Milk supply.—This was above suspicion. Each regiment had its own cows and dairy under the immediate charge of a trustworthy soldier. They were frequently visited and supervised by both the medical and regimental officers.

Influence of soil and rainfall.—There was no departure from the average rainfall, and no variations in the height of the subsoil water.

To sum up, in my opinion, the epidemic was undoubtedly caused by the pollution of the drinking water with the specific germ. How this occurred could not be traced, but a possible and probable cause exists in the contamination by natives. In addition the following predisposing causes were present:

i. A large number of young soldiers, recently arrived in India.
ii. Unusual fatigue and exposure to sun.

Given the proved pollution of the water supply with the specific germ, and these predisposing causes present, and there are all the factors that are likely to produce a severe outbreak of enteric fever.

The disease once started in an Indian cantonment, it is not difficult to understand how it spreads. The following aids are always present:—

i. Native attendants who are not clean in their persons or habits, handling and preparing articles of food, etc.

ii. Cases of "ambulant" enteric fever sleeping in the barracks and fouling the latrines. The importance of this cause of the spread of enteric fever has not received sufficient attention. Numbers of the cases did not report sick until they were well on in the second week of the disease, and all this time they were using and fouling the latrines, and then touching and handling the food that the other men had to eat. Men drawn from this class are not very particular about personal cleanliness, and the idea of washing their hands when they had been to the latrine would probably never occur to them.

iii. A good deal of stress has been laid on the possibility of flies carrying infection from the latrines to the food. It is possible that some infection is carried in this way, and flies are probably more numerous in Quetta than in any other place in India.

The first case was admitted to hospital on the 3rd of April, and the last on the 1st December. Thus the epidemic lasted for eight months, reaching its climax during the second week in September, when I had 75 cases in hospital. I have prepared the attached chart to show at a glance the course and progress of the epidemic.

From this chart it will be seen that the epidemic began mildly with a few cases during April, May, and the beginning of June. Then from the middle of June until the middle of September there was a rapid rise in the number of cases, week by week, until the climax was reached in the 75 cases under treatment at the same time. The number of cases then declined a little, but remained high until the third week in November. From this time there was a rapid drop, and when the last case was discharged from hospital the result of the epidemic was as follows:

Total cases admitted to hospital	141
Recoveries	117
Deaths	24

In reading this chart, it will be seen that if the numbers, represented by the red dots which show the fresh admissions, are added up, they total 141, which corresponds to the number of recoveries and deaths. The actual number of deaths from enteric fever was only 21, as 3 men died of sequelæ when they had recovered from the enteric fever, one from gangrene of the lungs, one from pulmonary tuberculosis, and one from abscess of the brain. However, they are included in the mortality of the epidemic, as the enteric fever was the primary cause of their contracting these diseases.

Out of such a large number of cases, as might be expected, there were many serious and interesting ones. The scope of this report precludes me from dealing with them *seriatim*, and I propose only to record the result of my experience in this epidemic, and the conclusions I have arrived at as to the special symptoms, complications, and treatment of enteric fever in India, illustrating my remarks by reference to some of the most interesting cases.

The following table gives a general outline of the epidemic from a clinical point of view:—

Total No. of cases.	No. of recoveries.	No. of deaths.	No. of relapses.	Total No. of days in hospital.	No. of cases complicated with pneumonia.	No. of cases complicated with peritonitis.	No. of cases complicated with hæmorrhage.	Remarks.
141	117	24	30	10,671	11	28	25	
	82·98 per cent.	17·02 per cent.	21·28 per cent	75·68 days for each case.	7·80 per cent.	19·86 per cent.	17·73 per cent.	3 deaths from sequelæ are included.

From this it will be seen that the recoveries were nearly 83 per cent., that there were 21 per cent. of relapses, and that the average duration of each man's stay in hospital was 75 days. 45 per cent. were complicated with either pneumonia, peritonitis, or hæmorrhage.

The temperature in enteric fever.—This is a symptom about which much has been written, and many conflicting opinions advanced, especially as to whether enteric fever in India is identically the same as enteric fever in Europe. In his work on this subject, Surgeon Major-General Hamilton states that the temperature of enteric fever in Europe rises higher than it does in India. But this has not been my experience either in this epidemic or in another very severe one in the Peshawar District. On the contrary, it has been my experience that in India the temperature rises higher, and that high temperatures are more persistent. Of course heat and malaria considerably modify the temperature, but I have had many cases of hyperpyrexia in enteric fever, which had never suffered from malaria, and in Quetta (5,600 feet above the sea) though the sun is very hot, yet the atmospheric temperature is hardly higher than a hot summer in England. Taking 105° F. as the limit which marks hyperpyrexia, out of these 141 cases there were 21 whose temperature exceeded 105°, 13 over 106° and 3 over 107° in the uncomplicated cases alone, making an average of 26·46 per cent. of hyperpyrexia in simple straightforward cases, which I think will be found to exceed the average of hyperpyrexia in cases in England. And in addition nearly every one of the severer complicated cases had very high temperatures. In all my cases, both mild and severe, a four hourly chart was kept as well as a morning and evening one. From an analysis of these charts, I find that the period of highest fever was, in the great majority of cases, during the second half of the first week and first half of the second week of the disease, the temperature gradually coming lower and lower throughout the third week. From these charts it is also found that the daily remittent type of the fever was very constant, the time of maximum temperature being in the evening between 6 and 8 p.m., and the lowest temperatures being recorded in the early morning between 3 and 5 a.m. I had also a number of cases whose maximum rise came earlier in the evening at 4 p.m., but these cases nearly always got a second rise at 8 p.m. and another at 11 p.m.; so much was this the rule that in the severer cases the times of maximum temperature were 4, 8 and 11 p.m., and I timed my evening visits accordingly. The above remarks refer to continued high temperatures recurring regularly, not to sudden single rises from various causes. There were many such sudden single rises of temperature, for the temperature in enteric fever is peculiarly susceptible to disturbance from various causes. Of these the two most common were excitement and constipation. When a death occurred, the temperature of nearly every man in the same ward ran up. The effect of constipation was also well marked in causing a sudden rise of temperature, and in the constipated cases I made it a rule never to let any patient go more than two days without having his bowels moved. This was always effected by simple soap and water enemata, but if the enema failed to act, it was almost invariably followed by a rise of temperature.

Duration of the fever.—The first day of disease was ascertained as accurately as possible in each case, and in each case it may be taken as correct, for the soldier knows the day on which his headache came on and he had no appetite. Under this heading, only the uncomplicated cases are considered, for of course the period of pyrexia in the complicated cases was considerably protracted. The duration of the fever is given by Murchison as 21 days, and he says that there are few exceptions to this, but during this epidemic I found that it was also very usual for the pyrexia to last 24 days, and a 28-day fever was also fairly common. Thus taking only the uncomplicated cases, the duration was as follows ;—

in 50 per cent. the period of pyrexia lasted 21 days.
„ 35 „ „ „ „ 24 „
„ 10 „ „ „ „ 28 „
„ 5 „ „ „ was protracted still longer.

The greatest length of any continued pyrexia was 37 days.

Out of the total number of cases, none reached normal before the 21st day. In the great majority of cases, when the morning temperature reached normal, the evening showed a rise of from 1° to 2°, lasting for several days. When the evening rise of temperature ceased, the morning temperature became subnormal, and this lasted until well on into convalescence. This, I think, will be found to be a very general rule in enteric fever. Frequently in India I have seen cases diagnosed as enteric fever, when the period of pyrexia has only lasted from 7 to 14 days, ending in complete and rapid recovery. These cases were undoubtedly malarial remittent fever, and I am of opinion that the *dictum* of Murchison is as true for enteric fever in India as it is for enteric fever in Europe, that "as a rule, from which there are few exceptions, the pyrexia lasts for 3 weeks." There are not two enteric fevers, one for India and another for Europe, but one enteric fever with the same specific cause and identical symptoms and pathological lesions. Of course, in India, both the temperature and other symptoms are frequently modified by malaria, but it has been my experience that these modifications are more common during convalescence than in the stage of continued pyrexia.

Charts show this condition very well. That of Bombardier O'B., R.A., is very interesting, and I shall allude to it again in discussing pneumonia as a complication. This man passed through a severe attack of enteric fever, complicated by pneumonia, which ended with a complete crisis. He then had typical ague for 10 days, and at the beginning of convalescence a regular daily morning subnormal temperature.

That of Private McK. is very similar. This man also passed through a very severe attack of enteric fever, complicated with pneumonia, and during the 6th and 7th weeks he suffered daily from ague. Though both these men were subject to ague, yet neither of them showed any malarial symptoms during the acute stage of the enteric fever, but, as soon as the continued pyrexia ended, then the ague set in, with cold, hot, and sweating stages. This, I think, will be found to be very generally the case, and it appears as if the enteric bacillus was inimical to the malarial germ, but that the latter reasserts itself with vigour in the weakened state of the blood during convalescence.

In the treatment of high temperatures, we have no means at our disposal to equal cold baths, for they not only control the temperature, but exert a great influence for good on the whole of the symptoms. The pulse increases in strength and volume, and as a rule immediately after a bath the patient falls into a sound, natural, refreshing sleep. Out of these 141 cases, I treated 111 with the cold bath, and my experience fully corroborates all that is claimed for this treatment by its most ardent advocates. I propose to consider it more in detail further on, in discussing the treatment of enteric fever in India.

Relapses.—In this epidemic there were a large number of relapses. I have seen relapses divided into "recrudescences" and true relapses, but in my opinion this is an arbitrary distinction. Recrudescence has been defined as including those cases in which a dying down temperature is revivified before its complete extinction, and a true relapse held only to occur after the temperature has reached normal. It seems to me that this distinction is pathologically incorrect, for it takes the symptom, pyrexia, as if it were the actual disease and not a symptom. In a relapse there is not only an arrest of the healing process taking place in the ulcerated glands, but fresh ulceration occurs, involving both the glands originally attacked and new groups of glands. The new and continued rise of temperature is but a symptom of this process, and it makes little difference whether the temperature has completely subsided or not, as long as by its gradual declension during the third week it has shown that active ulceration in the attacked glands has ceased. Therefore under this heading of "relapses" I propose to include those cases of so-called recrudescence.

In this epidemic out of the total 141 cases there were 30 relapses, 21·28 per cent. There were also several cases of double relapse. This is well shown in two cases. The first, that of Private W., is typical of this condition. This man was a nursing orderly in the enteric wards, where he doubtless contracted the disease. The original attack was mild and marked by constipation throughout. The first relapse set in after an apyrexial period of 5 days, and lasted for 13 days. He was then free from fever for two days when the second relapse set in, lasting for 12 days. In both relapses a fresh crop of rose spots appeared, and whereas in the original attack he suffered from constipation, in both relapses he had diarrhœa with typical stools. This I have found to be very frequently the case in relapses, and it appears to be quite independent of any errors in diet. The other case, that of Bombardier R., opens up the very interesting question of the possibility of a second attack after a short interval. This man passed through a mild but typical attack of enteric fever lasting 21 days. He then had a normal morning temperature for 3 days, when the first relapse set in. It was very prolonged, lasting 19 days, and was much more severe than the original attack. From the 3rd to the 8th day he suffered from hyperpyrexia, and at the end he had slight intestinal hæmorrhage. He became convalescent and entered on a long apyrexial period of 38 days, at the end of which the second relapse or second attack set in. This lasted for 21 days and presented all the symptoms of a fresh attack. He suffered from diarrhœa with the typical stools, and two fresh crops of rose spots appeared, one on the 8th and the other on the 13th day of the disease. In my opinion this was a second attack and not a relapse, and in support of this I would quote the case of Private B. This man passed through a fairly severe attack of enteric fever which lasted for 28 days. He was then convalescent for 60 days, was quite free from all symptoms; in fact he was up and walking about and had grown very stout. After this interval of two months he developed a second attack of enteric fever. It was ushered in by the typical diarrhœa and a gradually rising "ladder-like" temperature. This attack lasted for 24 days and his symptoms were well marked and unmistakable, including the appearance of two crops of rose spots, one on the 7th and the other on the 14th day. Now the long interval of two months almost precludes the possibility of this second attack being a relapse, and I think that it must be accepted as possible that a man can have two attacks of enteric fever with a very short interval between them. This is of peculiar interest just now, when the possibility of immunising young soldiers against enteric fever is being advocated. For if some of these immunised men do subsequently develop enteric fever, this fact must not be taken as disproving the value of the inoculation, seeing that in certain rare cases, one attack does not afford immunity even for a very limited period. It may have been a coincidence that I had two such second attacks out of 141 cases, and I do not for one moment suppose that this is anything like the proportion. All I uphold is that they do occur and are not quite so infrequent as has been supposed.

As a rule the relapses were much milder than the original attacks, and came on independently of any errors of diet or other extrinsic causes. I made it a rule that no man got any solid diet until his temperature had been normal morning and evening for 30 days. Even then he was very gradually brought back to his ordinary diet, beginning with milk puddings and bread and milk, and then chicken finely minced. In the great majority of instances the men were still on fluid diet when their relapses set in. The average duration of each relapse was 12 days, and the average interval between the original attack and the relapse was 3 days.

Severe relapses.—In several cases the relapse was much more severe than the original attack. One case illustrative of this is the case of Private T., which shows a typical mild uncomplicated attack of enteric fever lasting 28 days, followed after an interval of one day by a very severe relapse. The relapse was complicated by hyperpyrexia and intestinal hæmorrhage and collapse which lasted for 20 hours. He ultimately made an excellent recovery. Another illustrative case unfortunately was not so successful. The patient passed through a very mild, but perfectly typical, attack of enteric fever. On the subsidence of the fever his temperature remained down for 8 days when the relapse set in with a very sudden rise of temperature. He had persistent hyperpyrexia for 3 days and severe intestinal hæmorrhage. Then acute general peritonitis ensued and he died on the 10th day of the relapse. The post mortem examination showed extensive peritonitis, but no perforation, though the ulcers were large and numerous, and the floors of several of them consisted only of the peritoneal coat. In this case from the very sudden rise of temperature and rapid onset of the hæmorrhage I suspected that he had been given improper food either by the nursing orderlies or native ward servants, but I never could prove it.

In all relapses, both mild and severe, I found it a very general rule for one crop of rose spots to appear, and in some few there was a second crop, but this was the exception and not the rule. Also that diarrhœa was much more common in the relapses than in the original attack, even in those patients that had previously been constipated. As a rule I found that a relapse followed a mild attack more frequently than a severe one, but it was impossible to foretell which cases were going to relapse. Convalescence following a relapse was generally more rapid than that following an original attack, and in the relapse quinine seemed to be of more value.

Complications.—The most serious complications were pneumonia, peritonitis and intestinal hæmorrhage, and their relative frequency can be best seen from the following table :

No. of cases complicated with pneumonia.	No. of cases complicated with peritonitis.	No. of cases complicated with intestinal hæmorrhage.
11	28	25
7 ·80 per cent.	19 ·86 per cent.	17 ·73 per cent.

The relative mortality of these complications is shown in the following tables :

Total No. of cases.	Total mortality.	Deaths from pneumonia.	Deaths from peritonitis.	Deaths from hæmorrhage.	Other causes.
141	24 17 ·02 p.c.	2	4	7 Including one perforation.	11

	Pneumonia.	Peritonitis.	Hæmorrhage.
Number of cases	11	28	25
Deaths	2	4	7
Percentage of fatal cases ..	18·18	14·28	28·00

From these tables it will be seen that in this epidemic, peritonitis was the most frequent complication, but that intestinal hæmorrhage was the most fatal.

Pneumonia.—No cases of hypostatic congestion of the lungs are included under this heading, but only those of true lobar pneumonia. The percentage of cases that developed this complication is, I am aware, rather higher than usual. It is very prevalent in Quetta and patients suffering from enteric fever are peculiarly liable to it. In the plains of India it is different, and there it is an infrequent complication. I have several interesting charts showing the two diseases, enteric fever and pneumonia running concurrently. In some the pneumonia ended with a complete crisis accompanied by profuse sweating, and then the temperature rose again and resumed the characteristics of unmodified enteric fever. More frequently there was only an attempted crisis, the temperature dropping to 99° or 100° and then rising again. This is well shown in the case of Private R., whose was one of the most severe cases I have ever treated with a successful result. He developed pneumonia at the beginning of the 3rd week of enteric fever, and the two diseases ran together for eleven days, when the pneumonia ended with an attempted crisis, his temperature dropping from 105·4° to 99·4° with profuse sweating. It rose again the same evening to 104·4°, after which the enteric fever gradually subsided. A complete crisis occurred in the case of Bombardier O'B. Here the enteric fever and the pneumonia practically ended together, and the patient developed malarial fever, well marked ague, to which allusion has been made under the heading of temperature.

The great majority of cases developed this pneumonic complication during the 2nd week or beginning of the 3rd week of the enteric fever. All ended successfully, with the exception of two cases. Neither of these died in the acute stage, but of the consequences of the pneumonia, one dying of gangrene of the lungs and the other of tubercle of the lungs. The former case was that of Private C. This man passed through a very severe attack of enteric fever, complicated by peritonitis during the 3rd week, and by both peritonitis and pneumonia during the 4th week. He recovered from the enteric fever; but the consolidation of the lungs did not resolve. Ultimately gangrene set in and he died 7 weeks afterwards. The following is a short account of the post mortem examination: "The right lung was consolidated, with the exception of the upper half of the upper lobe; in the centre of the consolidated part was a large gangrenous area, of a dirty greenish brown colour, with a most offensive odour, readily breaking down and passing, without any line of demarcation, into the consolidated pneumonic tissue. The left lung was in the same condition, but here the gangrenous patch had broken down, leaving a cavity with ragged shreddy walls, full of the most fœtid gangrenous pus, and fragments of gangrenous lung tissue. On opening the abdomen, the peritoneum was found to be thickened and there were numerous adhesions. In the ileum there were numerous ulcers of Peyer's glands, firmly cicatrised and puckered."

Out of these eleven cases of pneumonia complicating enteric fever, eight had only the right base affected, while in three both lungs were attacked.

The treatment of pneumonia as a complication of enteric fever is necessarily very much more difficult than when it occurs as a primary disease, and often it was a nice question to decide to which of the two diseases the most attention should be paid. The greatest difficulty was in those cases in which there was much abdominal distension or peritonitis. In deciding this question, I think we must be guided by the disease which presents the more urgent symptoms. I found chloral and digitalis by far the best treatment, for while it treats the pneumonia, it exerts no influence for harm in the enteric fever. This was peculiarly well borne out in the case of Private R., above referred to. This man was violently delirious, and coughing up large quantities of thick viscid tenacious rusty sputum, but as soon as he was put on the chloral and digitalis, his delirium ceased and he practically slept through his pneumonia and enteric fever. In one case in which there was great dyspnœa and a good deal of bronchitis as well as pneumonia, I treated the patient in a steam tent with the chloral and digitalis, also with a successful result. Early this year I had two cases of enteric fever complicated by pneumonia in which I modified the above treatment. I treated both these patients in a Fenwick's ice cradle, and though they were both successful I have not had sufficient experience to speak decisively of its value, though it appears to be the rational line of treatment. Returning to those difficult cases of enteric fever where you have peritonitis as a complication as well as pneumonia, I had several such in this epidemic, and where there was constant vomiting and hiccough I did not hesitate to give opium freely, notwithstanding the pneumonia, and I never found that it did the pneumonia any harm. As for the general results of the treatment of this complication, I would point out that of the eleven cases I had in this epidemic none died directly of pneumonia. The two deaths that did occur were the results of sequelæ, which no treatment in the acute stage could have averted. About the influence of the cold bath treatment in causing pneumonia, I have some remarks to make later on when I come to give the results of my experience of the value of this treatment, but in passing I may state that I do not believe that thoracic complications are caused by chill, but by the enteric fever, and I do not for one moment believe that the bath treatment ever causes pneumonia, but on the contrary it lessens the susceptibility of enteric patients to pneumonia.

Peritonitis.—I am aware that I have shown a very much higher percentage of cases of this complication than is usual in enteric fever, but I believe that as a rule the frequency of this complication is very much under estimated. This arises from the difficulty of diagnosing tympanites from peritonitis, and I believe that many of the cases of so called tympanites are really cases of peritoneal inflammation. It is so difficult to estimate the amount of respiratory movement of the abdomen of a patient delirious from enteric fever that this point is of little practical diagnostic value. But where you get great pain and tenderness with constant hiccough and vomiting I think there must be inflammation of the peritoneum, and these are the symptoms I have relied on in diagnosing this condition. Most of the text books teach that peritonitis is an occasional complication of enteric fever, and that it is usually indicative of perforation, but such has not been my experience. I think that it most frequently arises from extension of inflammation through the peritoneal coat. I have made numbers of post mortem examinations on the bodies of patients who have died of enteric fever, and in those cases in which the ulcers were very thin, with floors consisting only of the peritoneal coat, I have always found a large amount of consecutive peritoneal inflammation. Again, the peritonitis of the text books is limited to acute general peritonitis with purulent effusion, and that, I grant, is but an occasional complication of enteric fever. It seems, however, hardly justifiable to limit the term peritonitis to this narrow margin, for in enteric fever there are many cases of peritoneal inflammation, severe and dangerous, although the pathological conditions do not reach the above extent. In this epidemic of 141 cases, I had only one case of perforation, and this I think is somewhat below the usual average, which I have seen estimated as high as 10 per cent. of the mortality.

I have found that peritonitis is, as a rule, a late complication, coming on generally in the third week of the disease. This is as might be expected, for it coincides with the time of the most active and extensive ulceration. When it sets in early it is a very grave symptom and frequently prognostic of a fatal result.

In the treatment of this complication the sheet anchor is opium, pushed as far as is safe. This with ice poultices to the abdomen and the minimum possible quantity of fluid has been my treatment throughout. In these cases I reduced the milk to 12 oz. in the 24 hours, and gave teaspoonful doses of Brand's essence and champagne at frequent intervals. When the vomiting was very persistent I substituted hypodermic injections of morphia instead of the opium.

The most severe and persistent case of peritonitis I had in this epidemic was that of Lance-Corporal B. His was the most severe case of enteric fever I have ever treated successfully, and his chart is very interesting. Peritonitis set in at the beginning of the fourth week with a temperature of 107·6°. For two weeks he lay in a most critical condition, and suffered from such persistent hiccough and vomiting that it was with the greatest difficulty I could get in enough nourishment to keep him alive, and for several days his only sustenance was nutrient enemata of raw beef juice. In his case I had to alternate the opium with strychnine and digitalis, as he was so exhausted. He ultimately made an excellent recovery, though he was 160 days in hospital, as his convalescence was greatly retarded by thrombosis of the left femoral vein.

The prevention of this complication depends I think on the careful dieting of enteric fever patients, and I cannot too strongly condemn, what appears to be a routine practice in India, the giving these patients from 4 to 5 pints of milk and as much soda water as they like to drink. Such a quantity cannot be digested and coagulates in masses which irritate the ulcerated intestine.

Intestinal Hæmorrhage.—Under this heading I have included all those cases whose motions showed the slightest trace of its having occurred. My experience of this complication has been the usual one—that it occurs at two different periods, either early or late, in the disease, and that the time of its occurrence has the greatest significance. That occurring early comes as a rule in small isolated bleedings, which do not produce collapse. This hæmorrhage is due to general capillary oozing from the inflamed and congested mucous membrane of the intestine, and is rarely a symptom of any danger. In fact cases in which these small isolated bleedings take place generally do well. The hæmorrhage which occurs late has a different cause and significance, and is a very frequent cause of death. It arises either from a vessel eroded in process of ulceration or from the separation of a slough. The bleeding is copious with a tendency to recurrence and produces great exhaustion and collapse. Sometimes the blood collects in the large intestine and is then passed in black fœtid masses, sometimes it is passed in clots, but most frequently it comes in a rush of liquid red blood. Including both these classes of intestinal hæmorrhage, in this epidemic, I had 25 cases, and it was the most common cause of death, the mortality being 7. Unfortunately as far as I have observed, there are no well marked premonitory symptoms. It is said, on quite insufficient grounds, I think, that severe and persistent headache is often followed by hæmorrhage. A sudden and rapid drop in the temperature often indicates that hæmorrhage has taken place before any blood appears in the stools. Great abdominal distensions and the onset of excessive diarrhœa sometimes gave warning of the approach of hæmorrhage, but most frequently it came on without the slightest warning. Nevertheless I made it a rule to give opium and turpentine, and to apply ice poultices to the abdomen, in every case which showed these symptoms of distension and excessive diarrhœa. It may be that this treatment averted the hæmorrhage in some cases, but of course it is impossible to speak decisively on this point, for it does not necessarily follow that every case which presents these symptoms will have hæmorrhage; still I think that it is a sound and rational treatment, and I am a great believer in the power opium has in averting untoward intestinal symptoms in enteric fever. The prevention of hæmorrhage is so important that I carefully noted the number of cases so treated, and give my results in the following table:—

No. of cases treated with opium.	No. of cases treated with turpentine.	No. of cases complicated with peritonitis.	No. of cases complicated with hæmorrhage.
51	24	28	25
36·17 per cent.	17·02 per cent.	19·86 per cent.	17·73 per cent.

In estimating these results it must be remembered that I have not confined the term "peritonitis" simply to cases of acute general peritonitis, but that it includes all cases of peritoneal inflammation whether localised or general. Similarly the term "hæmorrhage" is held to include all cases of intestinal bleeding, whether early or late, mild or severe. As only 4 of these cases of peritonitis were fatal, and only 7 (including one perforation) of the cases of hæmorrhage, I think that I may claim that this "anticipatory" treatment does in some cases avert intestinal symptoms, and in those in which these symptoms do occur, that it gives them the best possible chance of recovery.

It is almost impossible to prevent the recurrence of the bleeding in those cases in which the hæmorrhage comes on late in the disease and is the result of the erosion of a vessel or the separation of a slough. It is the repetition of the bleeding, day after day, that induces fatal collapse. This year I had a case in which it recurred for 6 days in spite of treatment, sometimes 2 and 3 times in each day, unfortunately with a fatal result. As showing the recurrent character of this hæmorrhage, an illustrative case is that of Private H., in which very severe and copious hæmorrhage came on during the 2nd week. His case was a very severe one from the beginning. During the first week his temperature was hyperpyrexial, the hyperpyrexia lasting all through notwithstanding the hæmorrhage. This is very interesting and unusual. On the 9th day of disease he had his first attack of hæmorrhage which was repeated the same day; on this occasion there was no drop in the temperature and no signs of collapse. This was due, I think, to his being a very powerful man of robust build. Unfortunately the hæmorrhage came on again the following day, and on this occasion, although there was a considerable drop in the temperature from 107° to 101°, yet there were no signs of collapse. He then had one day free from hæmorrhage, then it recurred on the two following days, and he died in the early morning following the last hæmorrhage. In this case I was obliged to break through my rule of discontinuing the bath treatment on the first suspicion of hæmorrhage, for it was the only means of successfully combatting such excessively high temperatures, and I do not think that this man died from the effects of hæmorrhage, but from the intensity of the fever. In marked contrast to this case was that of Private D. He was doing very well throughout the 2nd week, and except that he had excessive diarrhœa, he presented no serious symptoms. But hyperpyrexia set in at the beginning of the 3rd week, followed by hæmorrhage. This was repeated daily and produced profound collapse. His temperature on two occasions dropped to 96° and his pulse became imperceptible. The temperature chart is very interesting, for it shows the influence of approaching death on the temperature of the body. Notwithstanding the repeated and copious hæmorrhage there was an enormous rise of temperature from 96° to 107°, which was the temperature of his body at the moment of death, evidencing the disturbance to the thermogenetic centre. In other cases this disturbance is reversed, for while the thermolysis is enormous, the thermogenesis is *nil*. This is well shown in the case of Private M., who died during the relapse, from hæmorrhage. In his case the temperature of the body at the moment of death was 95°, showing a drop of 7° before death. There is a marked difference in the rise of temperature which shows reaction from collapse and that which shows the disturbance of the thermotaxic centre on the approach of death. To illustrate this I would quote the case of Sergeant K. Throughout the 3rd week he suffered from severe and repeated hæmorrhage. On the occurrence of the third hæmorrhage he became collapsed, his temperature dropping from 104° to 97°. He rallied under treatment and for the next four days his temperature chart shows the ordinary remittent type of severe enteric fever. The last hæmorrhage occurred on the evening of the 21st day at 8 p.m., his temperature being then 106°, and rising. I ordered him to be wet packed, to avoid, if possible, having to put him into a bath. This only reduced his temperature 2°, but at 9 p.m. the hæmorrhage came on, and at 10 p.m. he was collapsed with a temperature of 96°. He again rallied under treatment, reaction set in, and his temperature rose gradually all night, until it reached 102·8° the following morning. It is interesting to compare this rise of temperature indicating reaction from collapse, with the sudden shoot up of the temperature showing the disturbance of the thermotaxic centre on the approach of death.

Of the treatment of intestinal hæmorrhage I have a few remarks to make. Absolute rest, starch and opium enemata, ice enemata, ice to suck, ice poultices to abdomen, and opium and turpentine internally, sum up the treatment. Of the value of internal hæmostatics I am somewhat sceptical, with the exception of turpentine. Ergot I believe to be positively injurious in some cases, not because I believe that the limited amount of increased blood pressure it causes by the contraction of the arterioles has any influence in increasing the bleeding, but because it increases the peristalsis of the intestines, and defeats the object with which opium is given. While on the one hand you cannot allow a patient to die of hæmorrhage without doing all in your power to check it, on the other it is of little use in checking the hæmorrhage if the patient is allowed to die of collapse and exhaustion. To bring about the reaction from this collapse, the blood pressure must necessarily be increased with the increasing strength of the heart beats, therefore, though I think that this objection to ergot is untenable, yet I think that much harm is often done in pushing it too far and in continuing it too long. To combat the collapse following hæmorrhage I have found nothing as efficacious as strychnine, hypodermically at first, and then given by the mouth in conjunction with digitalis. I have tried nitro-glycerine but do not think that it is equal to strychnine.

The scope of this report precludes me from discussing all the ordinary symptoms of enteric fever, but in passing I may remark that in this epidemic the eruption of the typical rose-spots was peculiarly frequent and well marked. This eruption appeared in successive crops in 80 per cent. of the cases, while "tâches bleuâtres" were only developed in two cases. Constipation was rather more common than diarrhœa, but the disproportion was not marked. As I have stated previously diarrhœa was more common in the relapses than it was in the original attacks. Delirium and other head symptoms on the whole were infrequent, and there was not a single case of meningitis; this I attribute largely to the cold bath treatment.

Before I leave this subject of the symptoms and complications of enteric fever in India, I have some remarks to make about the formation of hepatic abscess in the course of enteric fever in India. Fortunately it is very rare—so rare that I have never seen it mentioned in any text book or in any report on enteric fever. But I had one case in this epidemic and another case again this year. It seems to me that it is possibly very closely allied to the tropical abscess of the liver following dysentery. For if hepatic abscess can occur from portal infection from dysenteric ulceration, why should it not occur from enteric ulceration? In a large number of cases of enteric fever the ulceration is not confined to the special glands in the small intestine, but the solitary glands of the large intestine are also enlarged and ulcerated, and further the enteric bacillus has been found not only in the fæces but also in the urine, and, after death, in the intestines, mesenteric glands, spleen, liver and kidneys. Lately the subject of dysenteric amœbic abscess of the liver has received renewed attention from the researches of Lafleur and Councilman, and their conclusions that amœbic abscess is invariably secondary to amœbic dysentery, while non-amœbic abscesses are independent of intestinal affections, seem to me to make it possible that the hepatic abscess occurring in enteric fever may have a similar origin, the enteric bacillus taking the part of the dysenteric amœba; and it would be very interesting to know if the enteric bacillus is found in the pus of these abscesses. When these two cases occurred I had no means at my disposal of determining this point. Of course, I only bring forward this theory as a bare hypothesis. I would quote the case of Private J., who died of hepatic abscess in the course of enteric fever. The case was a perfectly typical one of enteric fever, both as regards temperature, stools and rose spot eruption. Until the middle of the third week there was nothing to distinguish it from any ordinary case of enteric fever. Both spleen and liver were enlarged throughout the course of the disease, the latter not more so than is so frequent in enteric fever. On the evening of the 19th day of the disease, he complained of great pain in the hepatic region, and on examination I found that the liver had greatly increased in size and was painful on pressure; still I did not suspect the true state. His temperature dropped suddenly from 102·4° to 95·4° and he became partially collapsed; he rallied from this and his temperature rose gradually until it reached 100·3° the following evening. The next morning it dropped again to sub-normal, his respirations became rapid and shallow, and he died that day, the 21st of his enteric fever. I regret to say that I did not diagnose the true condition during life, but looking at it now with the light of further experience, it seems to me that the abscess must have formed very rapidly, and that this sudden drop in the temperature on the 19th day was the first indication of its formation. The case I had this year, I did diagnose during life, and notwithstanding the enteric fever I operated, as giving the patient the best chance of recovery, but though I opened and drained a large abscess, the patient died, and at the post mortem examination I found that the suppuration of the liver was multiple. In Private J.'s. case, the post mortem examination showed extensive typical enteric ulceration in the small intestine, several small round ulcers in the cæcum, and deep down in the right lobe of the liver was a large single abscess, about the size of a fair-sized orange. Though the mucous membrane of the large intestine was congested, it showed no signs of any dysenteric inflammation. It has suggested itself to me that possibly the cold bath treatment might predispose to this condition, and I think that it possibly might in certain cases of long residence in India, where there had been a history of dysentery and malaria; but Private J. had only been 1 year and 9 months in India, and had never suffered from either dysentery or malaria.

Treatment.—Among the numerous remedies suggested for the treatment of enteric fever, only two are worthy of consideration, hydropathy and the use of certain antiseptics which are credited with the power either of destroying the specific germs or of acting as antidotes to the poisons these germs elaborate. In this epidemic I gave the cold bath treatment such an extensive trial that I propose to confine my remarks about treatment almost entirely to it.

Bath treatment of enteric fever.—Probably in no epidemic in India has the bath treatment been so completely and systematically carried out as it was in this epidemic.

The following table gives the number of cases so treated and its results:

	Total number of cases.	No. of cases treated by baths.	Mortality of epidemic.
Number of cases	141	111	24
Percentage	—	78·72	17·02

From this it will be seen that nearly 80 per cent. of the cases were treated by this method and that the mortality of the epidemic was 17 per cent., which is a good deal less than the usual mortality of this disease in India.

I carried out this treatment in three forms:

(i) The cold bath method of Brand, temperature of bath 65° F.

(ii) The graduated bath as recommended by Ziemson (90° F. cooled down to 65° F.).

(iii) Wet packing and ice packing.

The majority of my cases were treated by the Brand method in its entirety, that is, the patients were put directly into a cold bath of a temperature of 65° and left in for 15 to 20 minutes, according as the temperature fell. I made one modification, and that was in the amount of temperature which was to be taken as the indication for a bath. Brand recommends that whenever the temperature, taken in the rectum, reaches 102·2° F., the patient is to be placed in a bath. This appears to me to be too low a temperature, and to necessitate too frequent bathing, for there is a limit to the number of baths a patient can take in the day. Accordingly I adopted a "rising" temperature of 103° taken in the axilla as my index, and even with this I frequently found it necessary to give as many as six baths in the day to one patient. I say a "rising" temperature advisedly, for there is a great difference between a temperature of 103° which is evidently rising higher, and one in which 103° is the apex of the rise.

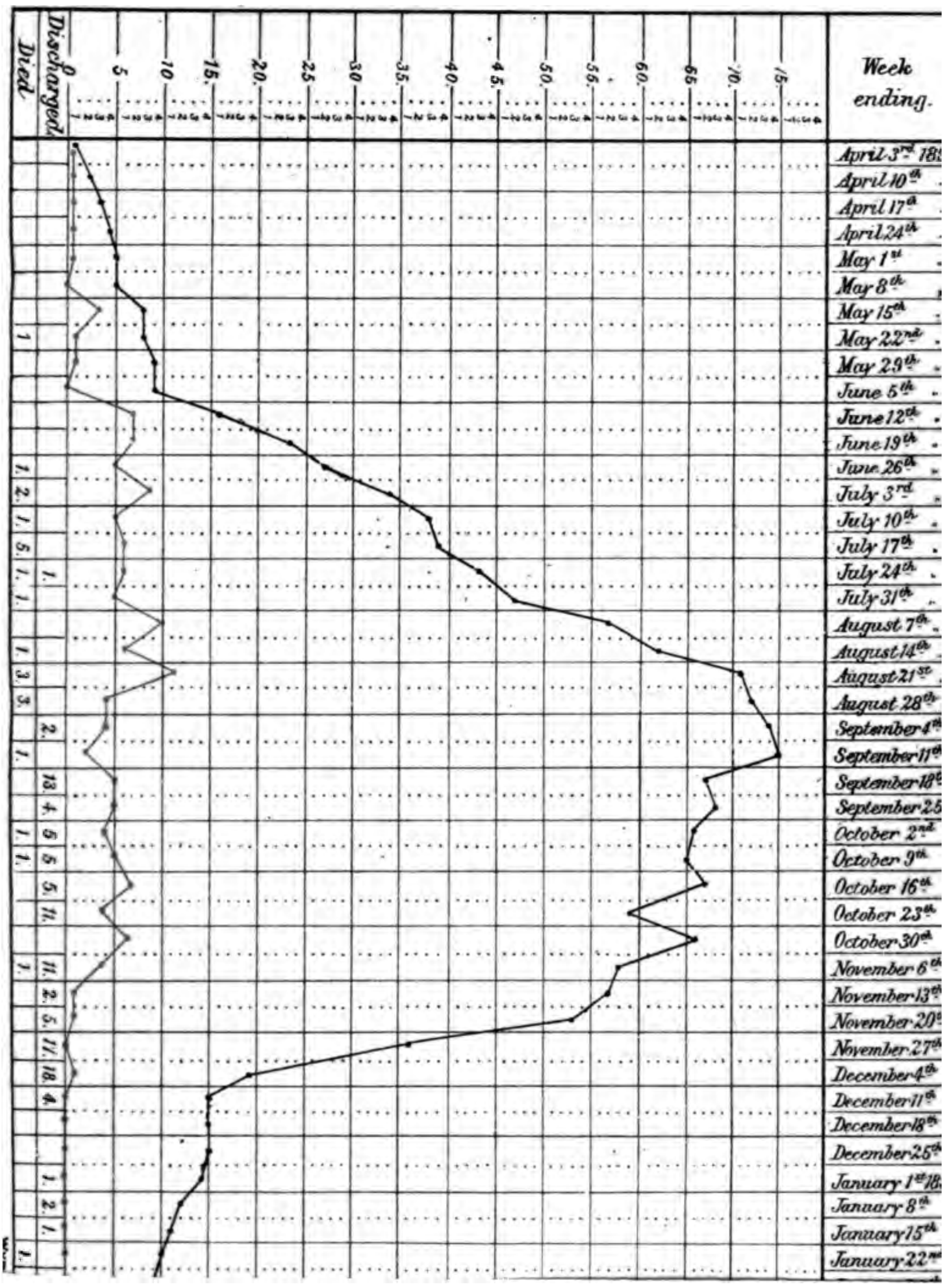
In carrying out this treatment it is absolutely necessary to have all the arrangements perfect, and both nurses and orderlies must know exactly what to do. My method was as follows; I had 3 large wards full of these enteric patients, and for the nursing of these I had always on duty one nursing sister and six trained orderlies as well as the native ward servants. I divided these cases up; in ward No. 1, I put all cases which were in the early stages and who required baths; this ward I called the bath ward. Into ward No. 2, I transferred all cases who had passed the bath stage, and the majority of these patients were in the 3rd to the 5th week of the disease. No solid food of any kind was allowed into these two wards, and this I found to be an excellent plan, for if you have a patient convalescent from enteric fever side by side with one who has only just got over the acute stage and who is craving for solid food, some of the diet of the former is pretty certain to find its way to the latter. And this is a plan I strongly recommend, especially in the treatment of the British soldier, never to have a patient on solid diet in the same ward with a patient on fluid diet. Ward No. 3, I called the convalescent ward, and in it were all those patients who had recovered and were on solid diet. Later on, when the cases grew still more numerous, and the men who had recovered but were not yet fit for duty accumulated, I was given a 4th ward, into which I put all this class of case, and which I called the discharge ward. In the bath ward I still further sub-divided the patients, keeping all those who suffered from hyperpyrexia and required numerous baths on one side of the ward. This obviated the necessity of constantly moving the heavy baths across the ward. I had 3 long deep baths on wheels, and very frequently they were all in use together. In this ward the patient's temperatures were taken every two hours, when awake, and more frequently when necessary. As far as possible I tried to prevent any man's temperature rising above 103° for it is on the *control* of the temperature that the success of this treatment depends, but unfortunately there was sometimes such a rush of high temperatures that it was not possible to keep them all down to this limit, and frequently I could have used 10 baths if I had had them and attendants enough. My orderlies were all very carefully trained, and I cannot speak too highly of their zeal and efficiency, for they had nearly all been working with me for two years, and I had eliminated all the untrustworthy ones. The bath treatment was then carried out as follows; whenever a patient's temperature was 103° and "rising," he was given a small dose of brandy and carefully lifted in his sheet by 6 orderlies, 3 on each side, the bath having been previously placed at the foot of his bed. He was gently lowered into it and the sheet wrapped round him. I always had enough water in the bath to cover him completely, coming up to his neck, a wet towel was placed on his head and fresh water poured over his head and shoulders from time to time. I also had a water-pillow placed in the bath, so that the patient could lie back comfortably. All the time he was in the bath, I kept a thermometer in his axilla and his temperature, pulse and general condition were carefully watched. In from fifteen to twenty minutes the temperature usually fell to 101° or 100° in the axilla, when the patient was taken out in his sheet and laid on his bed on a waterproof sheet which covered a clean dry sheet. He was then carefully and gently dried and the wet sheet and waterproof removed. He was now given 10 grs. of quinine and another small dose of brandy, and as a general rule he almost immediately fell into a sound refreshing sleep. All this process I carried out almost as a drill with the orderlies. They had each their place and duties, and the lifting and moving the patient was carried out with the greatest gentleness. As a rule the bath sufficed to keep the temperature down for from 3 to 4 hours, when if necessary another was given. At first I was a good deal troubled by the shivering and blueness that the bath caused, but as my experience increased I learnt that this is unavoidable and that too much attention need not be paid to it. The first two or three baths caused the most shivering, and when a patient had been under this treatment for some two or three days, as a rule, the shivering disappeared altogether. The good effects of these baths were so appreciable to the patients themselves, that they used to crave for them and frequently beg me to give them a bath even when their temperatures were comparatively low.

In carrying out this treatment I found that a certain class of case did not react well after the cold bath. The shivering and blueness of the extremities continued, and they required hot bottles and stimulants and friction to make them react I then modified the treatment and for these cases used the graduated bath, putting them in at 90° F. and cooling it down to 65°, and I found that it answered admirably and that as a rule there was no shivering or blueness of the extremities.

I had yet another class which required the 3rd form of hydropathy, the wet pack; an appreciable proportion of these cases of hyperpyrexia resisted both the cold and graduated bath. When put in a bath their temperature came down rapidly, yet when put back to bed in one hour it was as high again as ever. I tried various plans with these cases, and found the following generally most successful. They were placed in the bath and when their temperature was 101° in the axilla; they were taken out and placed in a wet pack, and I had very few cases in which the combined bath and wet pack did not succeed. In fact this combined treatment was so successful that latterly I adopted it more generally and found that it had a wonderful effect in controlling the temperature and in diminishing the necessity for giving very frequent baths.

This then was the line of treatment I adopted in 111 cases out of 141, with the results given above. I may claim that I have given it a very systematic and extensive trial, and though in my hands it has not done all that Brand claims for it (abolishes complications, turns a severe attack into a mild one, and reduces the mortality to 8 per cent.), yet it has been so successful that I venture to say it is far and away superior to all other plans of treatment. In giving his optimistic opinion of this treatment. Brand had evidently a very different class of patient to treat than falls to the lot of the army medical officer in India, for I know no more unpromising subject for enteric fever than the British soldier, saturated as he is with syphilis and malaria.

In concluding my remarks on this treatment, I must reiterate that its success depends on the thoroughness with which it is carried out. It must be a routine practice, for it does little good to plunge a man into a cold bath one day, and then on the others to dose him with depressing antipyretics. The treatment is directed against the symptoms of enteric fever in their entirety, and the cold bath not only reduces the temperature but controls it. But it does much more than this, and I cannot conclude better than by quoting the words of Brand: "It acts upon the nervous system in such a manner as to enable it to withstand the toxic influences of the infective principle and the products of its evolution. This it does by the action of cold water on the peripheral nerve endings, a reflex stimulus being transmitted to the nerve centres presiding over the circulation, respiration, digestion, excretion and nutrition. This general reinforcement of function is shown by the improved action of the heart, the first sound continuing distinct, the pulse being slower and more regular, by the deepening and slowing of the respiration, by the absence of nervous symptoms, by the increased secretion, the prevention of complications and rapid convalescence."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APPENDIX No. IX.

ON THE WORKING OF THE CONTAGIOUS DISEASES PREVENTION ACT, 1888 (CAPE COLONY), AND ITS EFFECT ON THE HEALTH OF THE IMPERIAL TROOPS STATIONED AT CAPE TOWN. (With three Charts.)

By Surgeon-Captain T. BROWNING, Army Medical Staff.

In this essay I propose to vindicate the Contagious Diseases Act of the Cape of Good Hope against two points of attack. First.—By proving that it has been the means of preventing thousands of soldiers in the garrison at Cape Town from being incapacitated by venereal diseases, and that the men who still contract such complaints suffer from a milder form than existed previous to the Act coming into force. Second.—That the Act is a humane one, relieving the sufferings of hundreds of prostitutes, and also alleviating the distress of women, who, though not strumpets, contract venereal diseases. I will further prove that there are effectual safeguards in the Act to secure virtuous women from being in any way interfered with.

Before analysing the statistics of venereal diseases for Cape Town, I will show the good effect of the Contagious Diseases Act in the United Kingdom for the period 1870–82, during which time the Act was in full force in several towns. I will compare the admissions at fourteen stations under the Act with the same number of stations not under the Act. The average strength in the former for the thirteen years was 47,394 men, and in the latter 19,218.

Deductions from such a large number of men will, I am certain, be accepted as convincing by any statistician. The figures form an ideal mass of statistics, as they are all correctly observed, are the same in kind, are all for the same period, are all localized (United Kingdom), are sufficiently numerous to give correct averages, and extend over a sufficient time.

I will first bring to notice that in the years preceding those in which the Contagious Diseases Act was in force, the subjected stations had a higher rate of admissions for venereal diseases than the group not brought under the Act. It is therefore evident that the subjected stations were fairly selected for comparison.

On examining the figures for the period mentioned, as given on page 10 of the Army Medical Department Report for 1883, what first attracts the attention of the statistician is the enormous difference between the number of admissions for primary syphilis in the subjected districts, compared with the admissions in the stations not under the Act. In the former the annual rate was 50 per 1,000, and in the latter 118 per 1,000.

The following table gives the total admissions for primary syphilis and the average strength :—

Average strength, and total admissions for Primary Syphilis. (1870-82.)

Fourteen stations, under the Act.		Fourteen stations, not under the Act.	
Average strength	47,394	Average strength	19,218
Total admissions	31,105	Total admissions	29,582

Let the statistician compare the figures and he will see that if the subjected stations had the admissions in the same ratio as those not under the Act, the total admissions for primary syphilis would have been 72,952; it is thus quite obvious that 41,848 men were prevented from contracting the worst form of venereal disease, in this one group of stations, owing to the Contagious Diseases Act being in force.

The number constantly in hospital for primary syphilis was only 3·97 per 1,000 in the group under the Act, whilst in the group where regulations were not in force it was 9·16 per 1,000. The actual number constantly in hospital in the subjected group was 188, but if it were in the same proportion as in the group not under the Act, the amount would have been 434; it is therefore evident that there was a daily saving of 246 men from being sick in hospital with primary syphilis. Assuming each soldier to cost £100 per annum it will be evident that in the thirteen years the C. D. Act saved the State £319,800, and rescued several thousand men from the misery and degradation of lying upon a bed of sickness suffering from one of the most loathsome diseases known to mankind.

In May, 1883, the Act was practically done away with, the compulsory examination of prostitutes having then ceased; and the following tables will be of interest as shewing the disastrous results of interfering with such an essential regulation:—

Constantly in hospital per 1,000 of strength, Primary Syphilis.

Year.	Group under the Act.		Group not under the Act.
1870–82	3·97		9·16
1883	8·66	Act modified	15·81
1884	12·41		14·01

Admissions to hospital per 1,000 of strength, Primary Syphilis.

Year.	Group under the Act.		Group not under the Act.
1870–82	50		118
1883	110	Act modified	188
1884	138		160

That the comparatively healthy state of the subjected group, from 1870 to 1882, was due to the C.D. Act, is evident from the above tables, the figures for which are taken from pages 10 and 11 of the A.M.D. Report for 1884. In 1883–84, when the modified Act was in force, the constantly sick and admissions in the stations formerly protected at once advanced.

Now compare the admissions for primary syphilis at two of the stations, one subjected to and the other not under the Act, viz:—Chatham-Sheerness and London.

The average strength of each district was about 4,000 men, and the places are not far apart.

In 1875 the admissions per 1,000 at Chatham-Sheerness were only 17, whilst at London for the same year the admissions were 187 per 1,000. For every man admitted at Chatham-Sheerness, eleven were admitted at London.

Before the Act came into force the admissions at Chatham-Sheerness were 94 per 1,000, average of 1860–66. The average of 1867–82 was only 49 per 1,000. On abolishing the compulsory examination of prostitutes the ratio for primary syphilis rose to 141 per 1,000 in 1884. The average for London, *1867–82*, was 181 per 1,000.

The effect of the Contagious Diseases Act in the United Kingdom on the number of admissions for gonorrhœa was not so marked as in the case of primary syphilis; the ratio of admissions was 84 per 1,000 in the subjected group, whilst in the stations not under the Act the ratio was 105 per 1,000. It is computed, however, that the Act prevented about 12,000 attacks during the period, 1870–82, at the fourteen stations where the regulations were in force.

In the year 1889 the Contagious Diseases Act was brought into force at Cape Town, and at the same time all regulations for checking the spread of venereal diseases were done away with in India, so, for a period of eight years, we can compare India, minus regulations, with Cape Town and an Act in force.

There is a great disparity between the admissions for primary and secondary syphilis for the years 1875–88 and the following years. In the first period, regulations were in force in India having for their aim the prevention of venereal diseases, whilst in the years 1889–96 all restraint was abolished. The average annual admissions per 1,000 for the fourteen years 1875–88 were 110, whilst the average for the following period, 1889–96, reached 210; these are the rates for the worst forms of venereal disease, primary and secondary syphilis.

The admission rate in all India for secondary syphilis has increased from an average of 26·4 per 1,000 during the years 1879–88, to an average of 69·6 per 1,000 during the years 1889–96. This excessive increase for the constitutional form of the disease shows clearly the great evil of doing away with all regulations for checking venereal disease. I may mention that when men whose blood is tainted by syphilis have to undergo the privations of warfare they invariably break down. This was manifested during the late Chitral Expedition.

The admissions for gonorrhœa during the past eight years have also reached a ratio unprecedented in that country. The figures for 1896 were 187·4 per 1,000.

The admissions for all forms of venereal diseases increased from 319, the average annual rate for the quinquennial period 1884–88, to 461 per 1,000, average rate for the years 1889–96. In 1896 the rate was 511·6 per 1,000, or, in other words, 70,484 European troops in India had 46,058 admissions for venereal diseases.

The statistics of some of the military districts, as may be imagined, are even more appalling. Compare the admissions for primary and secondary syphilis in the Rohilkhand District from 1880 to 1896. In the year 1884 the rate was only 76·2 per 1,000, whilst in 1896 it reached 457·4. The average annual rate 1880–88 was 134 per 1,000 of strength, or 24 above the rate for all India, whilst for the years 1889–96 it reached the enormous proportion of 370 per 1,000, or 160 above that for all India.

It will be noticed from Chart 1 that for the five years previous to the Act coming into force at Cape Town, the average admissions for primary and secondary syphilis were 371 per 1,000 of strength. Rohilkhand, for the years 1889–96, had just the same proportion of admissions, viz., 370, neither station being under a Contagious Disease Act.

For the nine years (1889-97) during which the Act has been in force at Cape Town the admissions were 168 per 1,000; Rohilkhand for a like number of years, 1880-88, had nearly the same number of admissions, viz., 134 per 1,000, both stations being under a Contagious Diseases Act.

Regulations in force.	Average annual admissions per 1,000, of strength, Primary and Secondary Syphils.
Rohilkhand, 1880-88	134
Cape Town, 1889-97	168

On comparing the admissions to hospital for venereal diseases for the quinquennial period before the Act, and the years following the Act, it will be at once seen that there is a vast difference in the total sick. The average for all forms of venereal disease for the years 1884–88 was 674 per 1,000, whilst the average for the years 1889–97 was only 349. This was not a gradual fall which might be accounted for by an improvement in morals, but a sudden descent from 828 per 1,000 in 1888, to 347 per 1,000 in 1889, and it is still decreasing. Last year it was only 216 per 1,000. (See Chart III.)

It is gratifying to notice the great fall in the admissions for the constitutional form of the disease. In 1888 the ratio was 209 per 1,000, whilst in 1896 it was only 27 per 1,000. The average rate for the quinquennial period 1884–88 was 137 per 1,000, falling to 51 per 1,000 for the period 1889–97. It will be seen by Chart II that the disease was rapidly increasing when no regulations were in force, but twelve months after the Act was promulgated the number of attacks fell to what must be considered a satisfactory ratio, and, with the exception of the years 1892, 1894 and 1895, the figures were under 50 per 1,000.

On examining Chart I it will be observed that the admissions for primary and secondary syphilis were 485 per 1,000 for the year 1885, and only 112 per 1,000 in 1897. The average for the five years, 1884–88, was 371 per 1,000, and for the years 1889–97 168 per 1,000. In 1894, from some unknown cause, the ratio went up to 232 per 1,000, but since that date the admissions have steadily come down year by year, and no doubt will continue to do so if the Act is not repealed.

The admissions for gonorrhœa have been very erratic. There has been, however, a satisfactory decrease since the Act came into force. In the quinquennial period, 1884–88, the ratio was 228 per 1,000, and for the years 1889–97, 169 per 1,000. In 1897 the proportion was only 103 per 1,000. As this form of venereal disease is of a local and temporary nature it does not merit serious consideration.

Compare the figures for all forms of venereal diseases and it will be seen that not only has the number of attacks fallen since the Act came into force, but that of late years a larger proportion consisted of milder complaints.

Before the Act the admissions for the milder forms of venereal diseases were 34 per cent. of the total, they are now 49 per cent., (average of the years 1889–97).

That the Contagious Diseases Act has produced a beneficial effect on the general health of the troops, is evident from comparing the total admissions per 1,000 of strength for all forms of disease, other than venereal disease, before the Act, with the admissions after the Act. For the five years previous to the Act, the average annual rate for diseases other than venereal diseases was 553 per 1,000 of strength, whilst for the years after the Act (1889–97), the admissions were only 502 per 1,000—a fall of about 10 per cent.

In an essay dealing with venereal disease, I think it is proper to briefly discuss the question of preventing the spread thereof by other means than by Contagious Diseases Acts. No doubt the morals of the British troops have improved, judging by the diminution in crime and drunkenness, but with the statistics of venereal disease in the army before me, I regret I cannot say that the morals of the soldier have improved in regard to keeping in a state of chastity. Education is said to have improved the morals of the people in England, and the fall in the admissions for venereal diseases at home is by some attributed to the Education Acts; it is strange, however, that when the soldier lands in India these Acts no longer benefit him. It cannot be questioned that at the present time the spread of education in England has taught the prostitutes there to appreciate the benefits of "personal hygiene," and in this way the Education Acts may be said to have minimized the danger arising from the repeal of the Contagious Diseases Acts in that country; I fear, however, that many years will elapse before the prostitutes of the Cape reach the same standard of education as those at home.

Chart I.

4-88 Average 371.
9-96 " 370.

4-88 Average 132.
Bl 9-97 " 168.

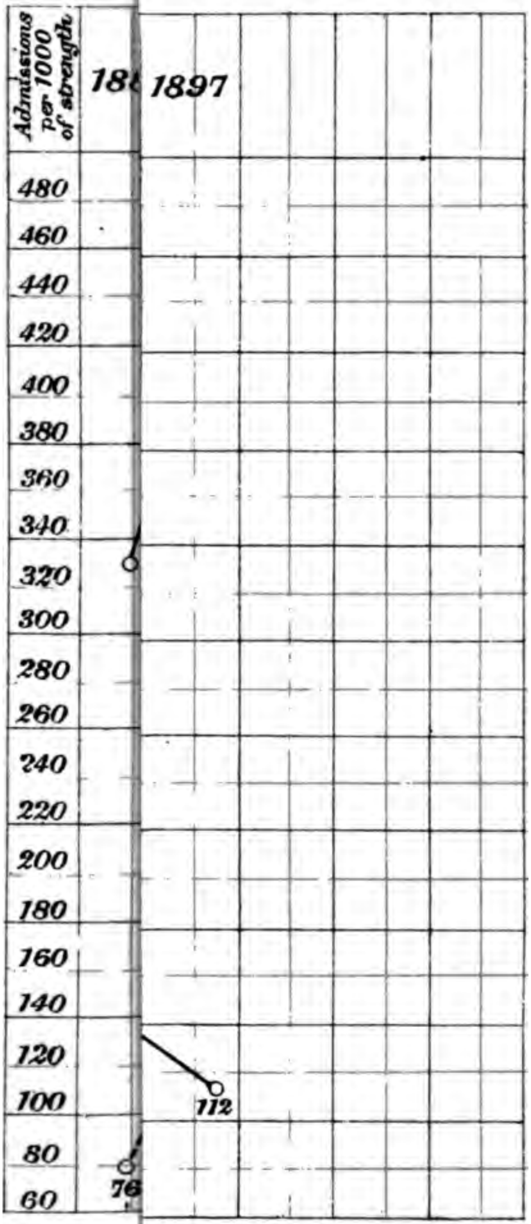

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Chart II.

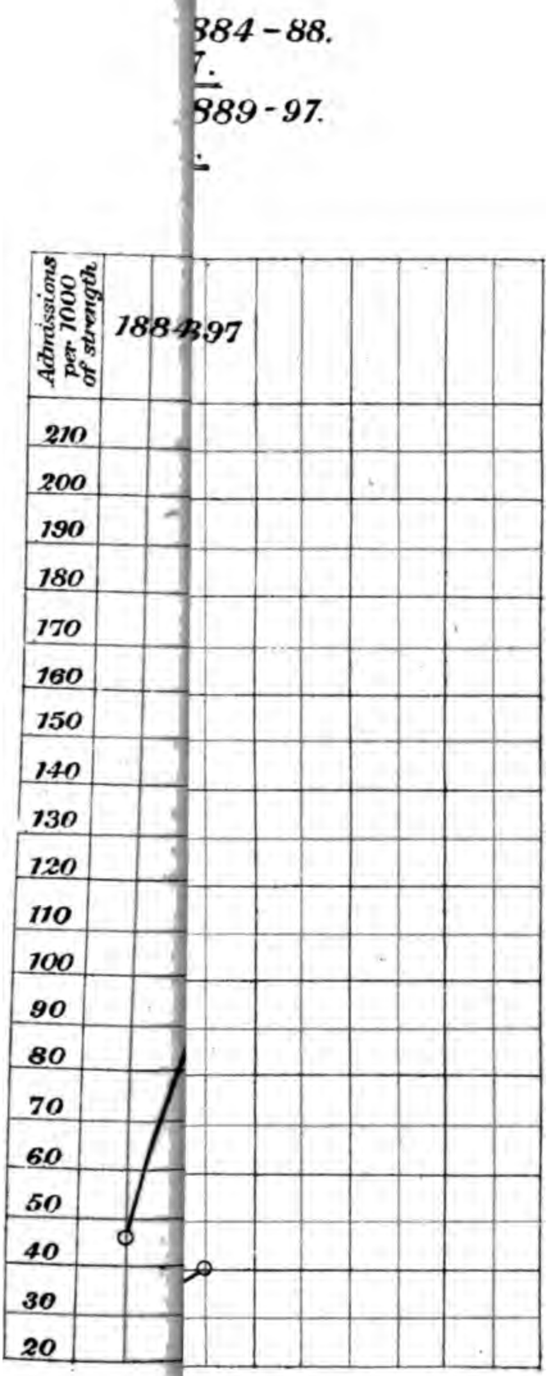

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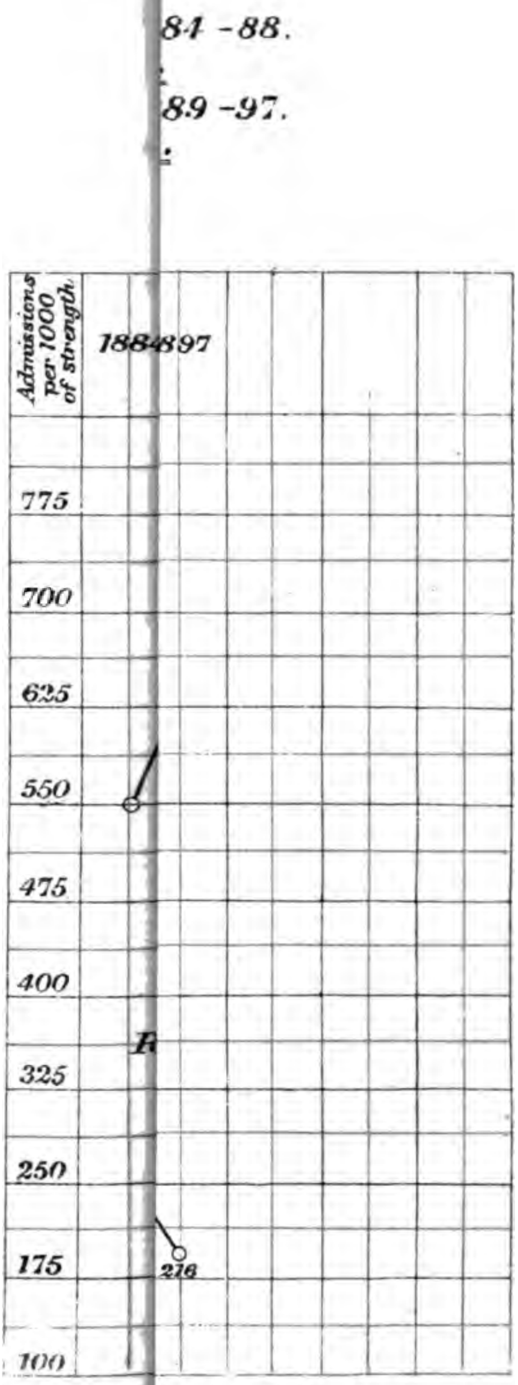
Chart III.



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APPENDIX No. X.

REPORT ON THE AIX-LA-CHAPELLE SYSTEM OF TREATMENT FOR SYPHILIS.

By Major W. Dick, M.B., Royal Army Medical Corps, Assistant Professor Clinical and Military Surgery, Army Medical School, Netley.

On the 19th September I proceeded to Aachen (Aix-la-Chapelle) in order to become acquainted with the system of treatment pursued there in cases of syphilis. By the kindness of Mr. Christopher Heath, I obtained an introduction to Dr. Feibes, who is one of the most successful practitioners in Aachen, who makes the treatment of this disease a specialty, and who kindly allowed me to attend his consulting rooms, and showed me a considerable number of cases of interest. This I found was very necessary, as there is no public institution in Aachen where persons of the poorer class are treated gratuitously, to which medical men might go and observe the system of treatment. All the cases I saw were examples of secondary syphilis; in very few were there skin symptoms—no primary cases were seen.

One of the first peculiarities that struck one on going to the baths and gardens, was the large number of well dressed men who seemed to be taking the waters, and who nearly all seemed to be English, or at all events English speaking. I met two foreigners who were undergoing a course of treatment, but both of them stated that they had contracted the disease in England.

Before going into the particulars of the treatment, I should like to state that I visited the Military Hospital at Aachen, where there is a garrison of 1,700 soldiers. There were 25 sick in it, these were all ordinary cases of sickness, none of them venereal, and I was told that there had been no venereal case for six months. I am sure that at one of our military hospitals there would have been double the number of sick, the excess of our sick over that in the German hospital being cases of venereal disease, in a garrison of the same strength.

The Aachen treatment may be described as of two kinds, viz., regimen and medicinal treatment.

1st. *Regimen.*—This to a great extent is dependent on the natural and acquired conditions of life at Aachen. The chief of these conditions is the number of springs of natural hot sulphur water. The water of these springs is alkaline with a large proportion of sulphur. The alkali is sodium, mostly chloride, but there is a considerable proportion of sulphate and sulphide. The taste and smell of the water is distinctly sulphurous, and the physicians of the place attribute a considerable amount of the success they have in the treatment of syphilis to this constituent. The temperature of the water from the springs is 46° C. (115° F.). The bath establishments are very perfect and are at the same time hotels, so that patients live in these bath-houses during the whole time that they are taking the treatment. In one of these establishments there is a curious old Roman bath. The hot water from the spring is pumped up over high trellis-work erections of wood to expose it to the air and cool it. No ordinary water is ever added to the natural water in the baths, so that this cooled spring water is required for reducing the temperature of baths. This sulphur water of Aachen is also used internally as well as in the form of baths, and there are kiosks all over the place where one gets tumbler after tumbler of this water to drink.

A patient on arriving for treatment is told to drink three glasses (about 1½ pints) every morning about 7 a.m., and to take brisk exercise for about half an hour. Everything is made pleasant at this early hour, as at this time the band plays and everybody whether undergoing treatment or not promenades in the garden. The patient then goes home and rests and partakes of a light breakfast. After this he has the medicinal treatment which will be described later; he then does what he likes, takes exercise short of fatigue, and a good meal in the middle of the day, with beer or light red wine. He then takes more exercise, enjoys himself in the afternoon, probably drinks more spring water, has his evening meal between 6 and 7 o'clock in the evening, and goes to bed early. This is the daily routine. Of course, as he is here purely for treatment, in addition to this regular method of living his mind is free from all business or other worries, and he has a complete change from his usual habits of life, as well as of surroundings and climate.

How much all this is essential to the treatment, I am not prepared to say, but there can be no doubt that the daily drinking of a water of this kind keeps the bowels in excellent condition for the excretion of, as the daily baths render the skin fit for the reception of, specific remedies.

The baths are of various kinds, ordinary douche, steam, and massage—very weak patients get vapour baths in bed, by an arrangement of pipes under a specially fitted bed.

The patient having drunk his water and taken his bath in the morning is now fitted to receive :

2nd. The *medicinal* treatment.—This consists simply of the inunction of mercury, in the form of mercurial ointment, carried to a much farther extent than we are in the habit of carrying it in this country, and there does not seem to be the fear of mercurialism which, I think, we have. The rubbers are men who seem to be adepts at their trade. As these men rub probably 6 or 8 patients every day of their lives, I was anxious to find out if they ever got mercurialised, but I was assured that on account of the great care they took of themselves they did not get any symptoms of mercurialism. I was very much struck by the efficient and masterly way in which they carried out their work. The inunction takes place over the whole body except the head, face, hands and feet. The rubber begins with a roll of ointment (the strength of the German ointment is 1 in 3, so that it is not so strong as the English ointment), say of 3 grammes, so that there is 1 gramme (16 grains) of pure mercury, and he rubs this into the calves of of the legs; he continues to rub steadily for 20 minutes. The patient then puts on his clothes with the ointment still on his legs. The ointment is therefore on his body until he takes his bath next day. The same routine is gone through next day, only that now the thighs are rubbed. On the third day the back is rubbed, on the fourth the chest and on the fifth the arms. This is the cycle, so that in five days the whole body has been rubbed. this cycle then is gone over again and again. The patient wears cheap underclothing during the whole of the treatment, and at the end the underclothing requires to be thrown away as it is quite impossible to wash it. The usual length of the treatment is about 45 or 50 days. If circumstances require it to be done in a shorter period, sometimes as much as 10 grammes of ointment are rubbed in daily It was striking to see so much mercury rubbed into the body without any apparent signs of mercurialism. It was stated that the usual sign of mercurialism was merely a stomatitis and could be avoided with care, and herein it was said was one of the great uses of the sulphur water of Aachen, viz., that an insoluble sulphide of mercury was formed in the intestines and carried off in the fæces.

Very stringent care is taken of the mouth and gums. A mouth wash is continually used, consisting of some astringent, such as acetate of alum. The patient carries about with him a bottle of this mouth wash, and every half hour takes a mouthful, with which he rinses his mouth. It is ludicrous to see in the streets the men continually taking a mouthful of something from a bottle and rinsing out their mouths. In addition to this, various tooth powders are used for cleansing the teeth and gums. Probably camphorated chalk is as good as any. The teeth must be carefully and thoroughly brushed with this tooth powder each time after food is taken. I must say that during the time I was at Aachen I carefully watched several patients undergoing this treatment, and I never saw any sign of mercurialism. If, however, any sign did appear, the treatment is stopped for a few days. It will thus be seen that the whole treatment consists in a generous diet with beer or wine, but no spirits, a fair amount of exercise, hot baths, the drinking of hot sulphur water, mercurial inunction and careful attention to prevent mercurial stomatitis.

It is evident that this system of inunction is only applicable where the skin is fairly free from sores and evidences of syphilis, such as rupia, &c. Until these sores are healed some other method must be adopted. The treatment I saw at Aachen for these cases was the hypodermic injection of calomel into the muscular mass of the buttock—5 to 10 per cent. of calomel in paraffin oil, half a gramme of this injected every 8 days. If carefully done there did not seem to be any pain, and if proper antiseptic precautions are taken, there is little risk of abscesses. I was not long enough at Aachen to see any cases which had markedly improved under this treatment, but one patient told me that he was very much better.

The local treatment of secondary sores and ulcers on the skin and in the mouth, throat, &c., was by the application of very strong solution of pure chromic acid.

In cases of specific spastic paralysis the mercurial treatment was carried out with the addition of electricity and Swedish massage.

From the above slight account of the Aachen treatment, I think it is evident that the treatment in its entirety can only be carried out there, or in other places that have nearly similar local conditions. Therefore it is probable that the well-to-do sufferers will always go to Aachen, and so far as the army is concerned, I think I should always recommend officers to go there who had been unfortunate enough to contract this disease. In military hospitals the following modified treatment might be tried in the case of soldiers:—

1. Every morning the soldier is to take a hot bath at a temperature of 90° to 100° F., into which a handful of ordinary washing soda has been thrown. He should sit in this bath up to the neck for half an hour.
2. Immediately after the bath, 1 to 2 drachms of an ointment (made by adding and mixing well 2 lbs. of the Ung. Hydrarg. of the British Pharmacopœia and 1 lb. of lard), to be rubbed in daily, the parts of the body each day being (*a*) legs; (*b*) thighs; (*c*) back; (*d*) chest; (*e*) arms. The rubbing to last for twenty minutes, syphilitic patients being taught to rub each other.
3. A gargle and mouth wash of one ounce of alum to the pint of water; a tablespoonful of this in a glass of water to be used every hour—and the teeth and gums to be brushed after each meal with camphorated chalk. Should the gums become tender they should be painted with a mixture of tincture of galls and tincture of myrrh in equal parts.
4. The treatment to be stopped for a few days on the appearance of mercurial symptoms.
5. The treatment to be carried out for a month, the same underclothing being used the whole time.
6. Ulcers about the mouth or throat to be touched with a 10 per cent. solution of chromic acid.
7. The whole treatment must be carried out under strict supervision.

Even this modified treatment I am afraid would not be thoroughly carried out by the soldier, whom it would be very difficult to persuade that the details were essential.

Patients taken sufficiently early would certainly benefit by this treatment, and the later severe manifestations of constitutional syphilis would in all probability be prevented.

APPENDIX No. XI.

CLINICAL REPORT OF FIVE CASES OF COMPOUND FRACTURE.

By Captain A. P. BLENKINSOP, Royal Army Medical Corps.

The consideration of the following five cases of compound fracture, which came under my care at the Herbert Hospital, Woolwich, may perhaps prove of some professional interest and practical value. As will be seen from the reports, all the cases made good recoveries. With the exception of Case 1, they have not, however, been selected on that account; but rather for the fact that they all present somewhat unusual features. Only the important points with regard to the nature and progress of the cases are recorded, and a few remarks have been added at the close of each, drawing attention to clinical aspects, or special means employed in treatment, which strike the writer as being possibly worthy of notice.

Case 1. *Compound fracture of the left ulna.*—Gunner R.B., R.A., age 23 years, was admitted to hospital on June 7th, 1888, suffering from a compound fracture of the left ulna, at the junction of its upper and middle thirds. The injury was caused by the kick of a horse. There was a circular wound, about the size of a shilling, on the posterior aspect of the forearm, which freely communicated with the broken bone, and around which the tissues were greatly bruised. The whole limb, from the wrist to the elbow, was much swollen. When first seen, hæmorrhage had almost entirely ceased.

The wound was thoroughly cleansed with carbolic lotion (1 in 20) and covered with a guard. The surrounding skin was then washed with soap and 1 in 20 carbolic lotion. A slight displacement of the fragments having been adjusted, iodoform was dusted over the wound and its vicinity, and the forearm enveloped in a large sal-alembroth wool dressing. A jointed, internal rectangular arm-splint, and a small straight splint on the back of the forearm, were then applied. Passive movement of the wrist and elbow joints was commenced on the eighth day, and continued until the support was removed from the limb.

The man's temperature never rose above 99° during his stay in hospital. Although the splints had to be readjusted from time to time as the swelling of the forearm disappeared, the primary dressing was not removed until June 19th, when the wound was found to be completely healed without any signs of suppuration, the wool being only slightly soiled where it had been in contact with the raw surface. All splints were discontinued by July 2nd, and the man was discharged to duty a few days afterwards with perfect use in the limb.

The above result is what one should aim at and expect in a case of uncomplicated compound fracture. Perhaps a good working rule is, that having once rendered the wound thoroughly aseptic, and having applied an efficient dressing, the covering should on no account be disturbed, so long as there are no signs of suppuration, as evidenced by a rise of temperature or an unusual amount of pain. In fact, when the wound has been once dealt with, it may, in many cases, be disregarded, and the fracture treated as a simple one, the dressing only being removed when the surgeon may reasonably expect to find a firm cicatrix beneath it. Of course, as in the case next described, in some instances the tissues may be so bruised at the time of the injury that sloughing must of necessity take place, and then more frequent dressings are required. I think that Gunner R. B. would have been incapacitated from doing his duty for a much longer period than five weeks had not passive movements of the joints been commenced early and carried out systematically.

Case 2. Compound fracture of the right tibia. Operation for ununited fracture.—Driver I. T., aged 20 years, was admitted to hospital on 31st March, 1888, suffering from a compound fracture of the middle third of the right tibia, caused by the kick of a horse. The broken bone was visible at the base of an irregularly lacerated wound, which was about half an inch in diameter. The line of fracture appeared to be almost transverse and there was very little displacement. There was a considerable amount of bruising of the surrounding tissues, which were much swollen.

The wound was treated in precisely the same way as that described in Case 1, and the limb put up in Cline's splints. Four days afterwards the temperature rose to 101° and some pain was felt over the seat of fracture. The dressing was consequently removed and a superficial slough, about the size of a florin, was found to have been formed by the death of the severely injured tissues immediately around the wound. Under dry antiseptic dressings, which were changed daily, the slough separated in twelve days without further rise of temperature. The resulting ulcer was perfectly healthy, and healed rapidly. On 5th May, the splints were removed, but it was obvious that no osseous union had taken place in the fractured bone. On 8th May, the patient was put under the influence of ether, and the ends of the fragments of the tibia forcibly ground together, the leg being subsequently immobilised in a Croft's plaster-of-Paris splint. This splint was removed on 14th June, and, although the position was perfect, and the man could bear some weight on the leg, little or no callus appeared to have been thrown out and there was distinct mobility between the two fragments.

On 27th June, ten minims of a 10 per cent solution of cocaine were injected deeply into the leg over the seat of fracture, and the following operation performed. The skin having been thoroughly cleansed and disinfected, a narrow-bladed Paget's abscess knife was introduced into the interval between the two pieces of the tibia, and some substance, which had almost the resistance of cartilage, divided. The ends of the fragments were then freely scraped and freshened. Having withdrawn the knife, it was re-introduced through the original wound and passed upwards between the skin and the sub-cutaneous surface of the tibia until the blade was completely hidden. The cutting edge was then turned towards the bone, and the periosteum freely divided by two or three longitudinal incisions, and a similar course was adopted with regard to the lower fragment. The patient experienced very little pain during the course of the operation, in which he took great interest. The trifling hæmorrhage which followed the final withdrawal of the knife was easily checked by the application of a pledget of sal-alembroth wool soaked in collodion. The leg was then firmly put up in a pair of Cline's splints. The small operation wound healed in a few days. On 7th August the splints were removed, when there was found to be firm union with no displacement. The man subsequently returned to his duty with perfect use in the leg.

As the patient was a strong healthy man who had never served abroad and who gave no history of any constitutional or debilitating illness, there could be no question of the failure of union being due to constitutional causes. It would seem rather to have arisen from some tissue having been forced between the fragments, and, as the fracture was caused by direct violence of a severe nature, this might easily have been the case. It will be seen that eighty-eight days intervened between the receipt of the injury and the operation. The limb was kept at rest and in good position during the whole of this period. It may therefore be fairly stated that this was a case of ununited fracture and not one of delayed union. I was recently asked by a civil practitioner to see a case in consultation, which I found to correspond in almost every particular with the one just described. The patient was a young healthy man who had sustained a compound fracture of the left tibia, owing to the wheel of a wagon having passed over his leg. When I saw him, nine weeks after the injury, the wound had healed, but there was only fibrous union between the fragments of the broken bone. I recommended that the small operation above described should be performed, and was kindly permitted to do it myself. The leg was at once put up in plaster-of-Paris. The man made a perfect recovery and was at work again in less than two months. I would now have no hesitation in carrying out this treatment in suitable cases of fracture of the tibia if union had not taken place in six weeks after the injury. Provided due precautions are taken to keep the wound aseptic, the risk of any bad results following the procedure is infinitesimal; a recommendation which is certainly not applicable to many of the methods described for exciting inflammation in the ends of the fragments of an ununited fracture. I have had no opportunity of employing this treatment in cases of non-union of long bones other than the tibia. I would certainly be of service in ununited fracture of the shaft of the ulna and perhaps elsewhere.

Case 3. *Compound fracture of the right tibia, with simple fracture of the fibula. Operation for ununited fracture.*—Gunner I. B., Royal Horse Artillery, was admitted to hospital on 18th June, 1889. When jumping from the shelf in the gymnasium, he alighted on the edge of the mattress which was employed to break the fall. He slipped from the mattress on to the boards and fell heavily, his right leg being "doubled up under him." When he endeavoured to rise to his feet, his injured leg gave way, and, on being examined by the non-commissioned officer in charge of the squad, the bone was found to be broken and protruding through a wound in the front of the limb. On admission to the hospital, the leg was found to be much bruised and swollen, and there was an irregular circular wound about one inch in diameter at the juncture of the lower and middle thirds of its anterior aspect. There was no hæmorrhage and the tibia was not protruding. On further examination the fibula was also found to be fractured in its upper third. There was not much angular deformity of the bone and very little shortening.

The wound and surrounding skin were thoroughly cleansed with carbolic lotion (1 in 20) and a large iodoform wool dressing applied. The limb was then put up on a slightly bent McIntyre's splint with the foot in good position. The measurements of the two limbs were then exactly equal, and, apparently, the fragment could be kept in position much more easily than is often the case with fractures of a similar nature. Owing to the great swelling of the soft parts, the line of the crest of the tibia could not be readily made out. The wound healed under one dressing, and the leg was then put up in plaster-of-Paris. On 1st August the splint was removed, and the fibula was found to be firmly united in good position; but there was only fibrous union in the tibia and some deformity over the seat of fracture.

On 12th August, the patient was anæsthetised and the following operation was performed. A T-shaped incision, the vertical line of which was three inches in length, was made through the soft tissues so as to expose the ends of the broken bone. It was then seen that the line of fracture had been obliquely from behind downwards, forwards, and slightly outwards; but, in spite of this, the lower fragment had become displaced in front, and to the inner side, of the upper. Consequently the periosteal surfaces of the two pieces of the tibia were in contact, and all attempts at reduction were futile. The ends of both fragments were freshened, and a notch was sawn with a Hey's saw in the upper, and a corresponding prominence made in the lower. An oblique hole was drilled on the inner, and a second on the outer side of the lower end of the upper fragment, and corresponding apertures made in the upper end of the lower fragment. Through these, stout silver sutures were passed, and twisted so as to fix the broken bone in true position. The operation wound was sutured with carbolised silk, and dressed with salalembroth wool. The leg was then put up in a Cline's splint.

The patient made a good recovery although it was somewhat delayed by the separation of two small sequestra, consisting of the bone immediately around two of the holes drilled for the wire sutures. The sutures themselves were removed on 7th October. By the end of November, the patient was able to walk about without a stick and there was only about one-eighth of an inch shortening of the fractured leg.

The special interest in this case centres in the peculiar displacement of the fragments of the tibia. I have never read of a precisely similar occurrence, and, before the introduction of *x*-ray photography, do not see how the condition could have been recognised without cutting down on the seat of fracture. The deformity was not evident at first, as it was masked by the great swelling of the soft parts, and, even when it was observed, was not great and might readily have been mistaken for an irregular outgrowth of callus. The measurements of the two limbs were identical. It is obvious that no attempts at reduction by extension and counter-extension, muscular relaxation, etc., could be successful, even were the displacement at once accurately diagnosed, and I am very doubtful if manipulation would have been of any benefit. At a later stage I am convinced that nothing short of a serious operation would have been of any avail. Even when I had the ends of the fragments exposed and could see exactly what was required, I had considerable difficulty in bringing the pieces of bone into proper position. I think that the necrosis of the small fragments of bone may be accounted for by the fact that an ordinary archimedian drill, such as is generally used by wood carvers, was the only instrument available for boring the holes for the sutures. This would not have taken place, and perhaps an even more perfect result would have been obtained, if the recently introduced method of fixing the fragments with Senn's bone ferrules had been employed.

The two following cases have some points of resemblance, and I have described them here on account of the serious nature of the injuries, and as furnishing examples of the great expansion of the field of conservative surgery by the introduction of antiseptics.

Case 4. *Compound fracture of the left tibia and fibula.*—Sergeant-Major B., Royal Artillery, was admitted to hospital on June 21st, 1888, suffering from compound fracture of the left tibia and fibula. The injury was caused by the kick of a horse. When brought to hospital the patient was suffering considerably from shock but the external hæmorrhage was very slight. The fracture was situated about four inches above the ankle joint, and there was extensive comminution of both bones. On the inner side of the leg a clean-cut vertical wound, about an inch and a half in length, communicated with the broken tibia. There was a small wound on the outer side of the leg which looked as though it had been caused by a splinter of bone passing outwards through the skin, and which evidently led down to the fibula at the seat of fracture. There was extensive effusion of blood into the soft tissues of the lower third of the leg, and over the dorsum of the foot. The foot felt cold, and pulsation in the posterior tibial and dorsalis pedis arteries could not be recognized.

The question of amputation was considered, but it was finally decided to attempt to save the foot. The wounds and surrounding skin were therefore cleansed with 1 in 20 carbolic lotion, as described in the treatmentof Case 1. The wounds were dusted with iodoform and that on the inner side of the leg sutured with silver wire. After the fragments of the bones had, with some considerable difficulty, been brought into good relative position, the whole of the lower part of the limb was enveloped in a large dressing of sal-alembroth wool. The leg was then put up on a McIntyre's splint and the foot kept well raised above the level of the trunk. On June 25th, as the patient complained of much discomfort, the dressing was removed. The wounds were found to have united by first intention, and the silver sutures were withdrawn from the inner one. The dorsum of the foot was much swollen and several bullæ, containing reddish serum, had formed beneath the skin in this situation. There were, however, no signs of gangrene. A small piece of iodoform wool was applied to the wound, and the limb again put on the McIntyre's splint as a temporary measure until a more suitable apparatus could be obtained. On June 28th, a McNalty's splint was substituted for the McIntyre. There was a considerable amount of effusion into the ankle joint, and much trouble was caused by a severe attack of gout which affected the metatarso-phalangeal joint of the left great toe. On August 7th the splint was finally removed. There was found to be marked œdema about the ankle but the bones were firmly united. The lower end of the fibula was displaced very slightly backwards and outwards and this was the only recognisable deformity. The patient was ordered to douche the ankle three times daily, and carefully regulated passive movement and massage were employed until practically perfect movement of the joint was restored. He left hospital for duty on September 22nd, when there was no pain in the leg or œdema of the foot. For some year or more after this date I kept him under observation, and was pleased to find that he had not again to report sick.

As is mentioned incidentally in the notes of the above case, the question of amputation was entertained when the patient was first admitted to hospital. It was only after the risks which he would run, if an attempt were made to save his foot, were explained to him, and at his earnest solicitation, that conservative methods were finally adopted. The indications for operation were (1) extensive laceration of the soft parts; (2) considerable comminution of bones; (3) want of pulsation in the arteries below the seat of fracture; (4) possible implication of the ankle joint; (5) marked lowering of temperature in the foot. The ultimate termination of the case proved that any or a combination of all of these unfavourable conditions do not of necessity prevent a satisfactory result from being obtained. Although gout is almost invariably mentioned among the constitutional causes of ununited fracture, the disease in this case appears to have had no influence whatever on the union of the fragments.

Case 5. *Compound dislocation of the left ankle joint, with fracture of the external malleolus.*—R.G., aged 14 years, the son of an army schoolmaster, was admitted to hospital on June 5th, 1889, suffering from a compound dislocation of the left ankle joint with a fracture of the lower end of the fibula. While climbing into a church enclosure, he slipped, and one of the halberd-shaped spikes of the railing entered the outer side of his leg, just above his shoe, inflicting the above injury. The spike appears to have opened the joint, and the boy remained suspended for a few seconds until he was disengaged by a man who was passing by at the time of the accident. The dislocation was reduced before admission; but the astragalus was described as having been displaced forwards and outwards. There was a T-shaped wound, the vertical and transverse limbs of which were about two inches in length, immediately above the external malleolus. This wound communicated freely with the ankle joint. The fibula was transversely fractured one inch from its lower end. The bleeding, which was stated to have been considerable at the time of the injury, had entirely ceased when the boy reached the hospital. The tissues round the ankle were much bruised and swollen.

The wound was thoroughly washed out with 1 in 40 carbolic lotion, and the surrounding skin carefully cleansed with soap and 1 in 20 carbolic lotion. Finally the whole of the injured part was freely bathed with lotion of the latter strength. The wound was sutured with silver wire, and a large dressing of sal-alembroth wool applied. The fractured fibula suffered little displacement, and this was easily rectified. The ankle joint was immobilised by a side-splint with a foot-piece.

The boy complained of very little pain and the temperature never reached 100°. On the morning of June 7th the dressing was found to be "through," so a fresh dressing of sal-alembroth wool was applied. There had been slight hæmorrhage from the wound, which otherwise looked well. There was considerable swelling around, and some effusion into, the ankle joint. After the dressing, the limb was fixed on a McNalty's splint. A few days subsequently the wound was found to be completely healed and the sutures were removed. There were no signs of suppuration. On June 24th the foot was found to be somewhat inverted. A straight outside wooden splint, carefully padded so as to correct the deformity, was therefore applied. On August 11th this splint was finally removed and passive movement of the ankle joint commenced. A considerable amount of callus had been thrown out around the seat of fracture in the fibula, but the foot was in good position and the ankle joint could be slightly flexed and extended. Passive movement, massage, and cold douching were employed for the following few weeks, and the patient was discharged from hospital on September 8th. He then did not walk in the least lame, and had perfect use in his ankle. Nearly all the callus which had been formed around the external malleolus had been absorbed. I saw the boy three months after he had left the hospital, and he then did not suffer the slightest inconvenience from his injury and was fully as active as most lads of his age.

The fact that the joint was extensively opened at the time of the accident was obviously of material advantage in the subsequent treatment. Had the wound been smaller the difficulty in rendering the synovial cavity aseptic would have been much enhanced. It will be noticed that no attempt was made to drain the joint, a procedure which is frequently recommended in cases where the wound is large and the joint cavity has been exposed to probable infection.

While writing the account of the foregoing cases, I have endeavoured to avoid, as far as possible, the reiteration of such facts as are of common knowledge to the profession and which are to be found in every text-book on surgery. The record of individual experiences of necessity imposes on the writer a somewhat didactic tone, and, should any of the expressions of opinion given appear to be too dogmatic, a natural prejudice in favour of procedures and methods which have given good results in one's own hands may perhaps be pleaded in extenuation.

APPENDIX No. XII.

REPORT OF A CASE OF ACUTE ASCENDING SPINAL PARALYSIS (LANDRY'S PARALYSIS).

By Surgeon-Major J. R. **Barefoot**, Army Medical Staff.

The patient, (Lance-Sergeant A. P., 1st Battalion Hampshire Regiment, age 26$\frac{3}{12}$, service 11$\frac{5}{12}$, service in India 11$\frac{5}{12}$), was carried to the Station Hospital, Multan, Punjab, on 15th February, 1898, complaining of paralysis of the lower extremities.

Previous history.—Patient was born and bred in India, (Madras Presidency), and had enjoyed good health up to the time of his present admission. He had one admission to hospital in March, 1892, for primary syphilis; the sore is described in his medical sheet as a simple ulcer, and, with local treatment only, disappeared in 18 days; no secondary symptoms ever followed. He has not been in hospital since. There is no history of bites of any animal, or chill, or ague.

History of present illness.—Patient states that while shooting on the range about a week before admission to hospital, he got a "touch of the sun," which gave him a headache. (There was no great heat during the week; the highest recorded temperature of a ward at the hospital was 70° F.) The pain in the head continued for about three days and slowly disappeared. Patient then noticed his legs were becoming weaker and weaker, till at last he was unable to stand; he had a feeling of numbness all down the lower extremities. This numb feeling started in the feet and gradually extended up the extremities. The upper extremities then began to be affected; numbness started in the fingers and gradually extended upwards to forearm and arm. He could not raise his arms above his head. He had no pain at all during the whole of this time.

On admission it was found that the patient could not stand; the muscles of both upper and lower extremities were flaccid, but there were no tremors or rigidity; there was no wasting of muscle, there was no loss of feeling, no neuralgic pains in the extremities; the tendon reflexes had disappeared, but the faradaic electrical excitability of the muscles remained; the loss of power of the lower extremities was only partial; he could slowly move his legs, but the weight of the bedclothes, or even only a sheet, prevented his moving his legs at all. His grasp was very feeble. He could pronate and supinate his forearm and flex the forearm on the arm, but he could not raise his arm above his head—(this condition was more marked in the right arm). There was no inequality of the pupils, he still retained power over his bladder and rectum, his pulse was good and strong (80 per minute); his temperature on admission was normal but rose to 100·6 F. on the 15th evening; it was normal on 16th (morning), and only 97·8 F. on the 16th (evening), and it was 100·6 on the 17th (morning).

On 16th, patient's symptoms became aggravated, and he then noticed he was beginning to have some difficulty in swallowing. On 17th (morning), about 3 a.m., patient's respiration became hurried and laboured; his pulse, however, was strong, though a little quickened (100 per minute). His swallowing became more and more difficult, and his voice weaker. He could not pass his urine, (no doubt due to the abdominal muscles becoming paralysed). About 10 a.m. the same day he could not speak above a whisper, he could not swallow, his breathing was very laboured, his pulse very quick but strong (130 per minute). About half an hour before death his extremities and head and face became livid, but his mental functions were unimpaired to the last.

He died at 12.15 p.m. on 17th February, 1898. Treatment was of no avail.

Post-mortem appearances.—Examination made 23 hours after death. Body was well nourished, deep staining at all dependent parts of the body.

The post-mortem appearances were generally negative, only congestion of all the organs of the body was found; the blood was in a fluid state, the spleen was greatly enlarged and congested and weighed 18 ozs. There was a small patch of meningitis at the vertex of the brain, which caused the membranes to adhere to the brain substance; the whole of the vessels of the brain were engorged with fluid blood. The spinal column was deeply congested, but otherwise appeared normal. The stomach and small intestines were normal, but the whole of the large intestine was deeply congested; the mucous membrane lining the large intestine was thickened and quite black in colour.

APPENDIX No. XIII.

HEIGHTS, WEIGHTS, and CHEST MEASUREMENTS of candidates medically examined for commissions in the Army, etc.

Heights, from 1st January, 1889, to 24th September, 1898.

Heights.	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	Total at each Height.
ft. in. ft. in.									
5 0 to 5 1 ...	—	2	—	—	—	—	—	—	2
5 1 to 5 2 ...	—	1	2	3	—	—	—	—	6
5 2 to 5 3 ...	1	6	5	6	—	—	—	—	18
5 3 to 5 4 ...	1	15	25	10	7	4	4	2	68
5 4 to 5 5 ...	3	57	83	29	8	10	7	6	203
5 5 to 5 6 ...	7	90	178	72	20	37	14	8	426
5 6 to 5 7 ...	5	126	295	145	40	56	34	9	710
5 7 to 5 8 ...	14	170	483	234	73	105	48	26	1,153
5 8 to 5 9 ...	8	210	529	281	100	115	81	26	1,350
5 9 to 5 10 ...	10	196	509	266	87	139	80	25	1,312
5 10 to 5 11 ...	5	177	403	196	103	131	95	23	1,133
5 11 to 6 0 ...	5	111	318	179	76	95	69	18	871
6 0 to 6 1 ...	6	55	174	122	51	73	40	9	530
6 1 to 6 2 ...	3	28	76	53	26	32	18	7	243
6 2 to 6 3 ...	—	14	48	36	16	19	7	2	142
6 3 to 6 4 ...	—	7	22	9	9	9	7	—	63
6 4 to 6 5 ...	—	1	5	3	—	4	1	1	15
6 5 to 6 6 ...	—	—	1	1	3	3	2	1	11
6 6 and upwards ..	—	3	1	1	—	—	—	—	5
Total at each age	68	1,269	3,157	1,646	619	832	507	103	8,201

Heights.	Proportion per 1,000 at each Age.								Total Proportion of each Height per 1,000.
	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	
ft. in. ft. in.									
5 0 to 5 1 ...	—	2	—	—	—	—	—	—	—
5 1 to 5 2 ...	—	1	1	2	--	—	—	—	1
5 2 to 5 3 ...	15	5	2	4	—	—	—	—	2
5 3 to 5 4 ...	15	12	8	6	11	5	8	12	8
5 4 to 5 5 ...	44	45	26	17	13	12	14	37	25
5 5 to 5 6 ...	103	71	56	44	32	44	28	49	52
5 6 to 5 7 ...	74	99	93	88	65	67	67	55	86
5 7 to 5 8 ...	205	134	153	142	118	126	94	160	140
5 8 to 5 9 ...	117	166	168	171	162	138	160	160	163
5 9 to 5 10 ...	147	154	161	161	141	167	158	154	159
5 10 to 5 11 ...	74	139	128	119	166	138	187	141	137
5 11 to 6 0 ...	74	87	101	100	123	114	136	110	105
6 0 to 6 1 ...	88	43	55	74	82	88	79	55	64
6 1 to 6 2 ...	44	22	24	32	42	38	35	42	29
6 2 to 6 3 ...	—	11	15	22	26	23	14	12	17
6 3 to 6 4 ...	—	6	7	5	14	11	14	—	8
6 4 to 6 5 ...	—	1	2	2	--	5	2	6	2
6 5 to 6 6 ...	—	—	—	1	5	4	4	6	1
6 6 and upwards...	—	2	—	1	—	—	—	—	1
Total at each age	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Weights, from 1st January, 1894, *to 24th September,* 1898.

Weights.	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	Total at each weight.
Under 100 lbs. ...	2	5	2	1	—	—	—	—	10
100—110 lbs.... ...	2	17	12	—	—	—	1	—	32
110—120 „	9	84	76	12	7	7	5	1	201
120—130 „	16	153	197	22	34	37	18	6	483
130—140 „	12	168	248	33	56	75	42	20	654
140—150 „	11	95	218	42	78	114	63	16	637
150—160 „	6	54	133	28	39	55	37	15	367
160—170 „	3	28	64	4	18	39	25	9	190
170—180 „	—	3	18	6	7	6	12	4	56
180—190 „	1	2	4	1	4	10	2	—	24
190—200 „	—	—	2	—	—	1	2	3	8
200 lbs. and upwards	—	—	1	—	2	5	—	—	8
Total at each age	62	609	975	149	245	349	207	74	2,670

Weights.	Proportion per 1,000 at each age.								Total proportion of each weight per 1,000.
	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 44.	
Under 100 lbs. ...	32	8	2	7	—	—	—	—	4
100—110 „ ...	32	28	12	—	—	—	5	—	12
110—120 „ ...	145	138	78	80	29	20	24	13	75
120—130 „ ...	258	251	202	148	139	106	87	81	181
130—140 „ ...	194	276	254	221	229	215	203	270	245
140—150 „ ...	177	156	224	282	318	327	304	216	239
150—160 „ ...	97	89	136	188	159	157	179	203	137
160—170 „ ...	49	46	66	27	73	112	120	122	71
170—180 „ ...	—	5	19	40	29	17	58	54	21
180—190 „ ...	16	3	4	7	16	29	10	—	9
190—200 „ ...	—	—	2	—	—	3	10	41	3
200 lbs. and upwards	—	—	1	—	8	14	—	—	3
Total at each age ...	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Chest Measurements, from 1st January, 1889, *to 24th September,* 1898.

Chest Masurements.	16 to 17 years of age.	17 to 78.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	Total at each Chest Measurement.
Under 30 inches ...	2	11	9	2	—	—	—	—	24
30—31 inches ...	—	37	45	18	3	2	1	—	106
31—32 ,, ...	5	117	249	92	13	17	6	4	503
32—33 ,, ...	11	235	468	240	40	42	19	9	1,064
33—34 ,, ...	17	317	717	389	110	127	62	23	1,762
34—35 ,, ...	16	259	753	394	162	191	122	46	1,943
35—36 ,, ...	10	172	497	278	146	206	120	28	1,457
36—37 ,, ...	4	84	277	147	90	137	95	27	861
37—38 ,, ...	2	20	92	57	31	61	50	14	327
38—39 ,, ...	1	13	37	24	17	30	23	6	151
39—40 ,, ...	—	2	8	4	5	11	4	5	39
40 ins. and upwards	—	2	5	1	2	8	5	1	24
Total at each age ...	68	1,269	3,157	1,646	619	832	507	163	8,261

Chest Measurements.	Proportion per 1,000 at each age.								Total proportion of each chest measurement per 1,000.
	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	
Under 30 inches ...	29	9	3	1	—	—	—	—	3
30—31 inches ...	—	29	14	11	5	2	2	—	13
1—32 ,, ..	74	92	79	56	21	20	12	24	61
32—33 ,, ...	162	185	148	146	65	50	37	55	129
33—34 ,, ...	250	250	227	233	178	153	122	141	213
31—35 ,, ...	235	204	239	239	262	230	241	282	235
35—36 ,, ...	147	135	157	169	236	248	237	172	176
36—37 ,, ...	59	66	88	89	145	165	187	166	104
37—38 ,, ...	29	16	29	35	50	73	99	86	40
38- 39 ,, ...	15	10	12	15	27	36	45	37	18
39—40 ,, ..	—	2	2	2	8	13	8	31	5
40 and upwards ...	—	2	2	1	3	10	10	6	3
Total at each age	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

APPENDIX XIV.

APPENDIX No. XIII.

TABLES showing the AGES, HEIGHTS, WEIGHTS, and CHEST MEASUREMENTS of candidates medically examined for commissions in the Army, etc.

Heights, from 1st January, 1889, to 24th September, 1898.

Heights.	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	Total at each Height.	Heights.	Proportion per 1,000 at each Age.								Total Proportion of each Height per 1,000.
											16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	
ft. in. ft. in. 5 0 to 5 1 ...	—	2	—	—	—	—	—	—	2	ft. in. ft. in. 5 0 to 5 1 ...	—	2	—	—	—	—	—	—	—
5 1 to 5 2 ...	—	1	2	3	—	—	—	—	6	5 1 to 5 2 ...	—	1	1	2	—	—	—	—	1
5 2 to 5 3 ...	1	6	5	6	—	—	—	—	18	5 2 to 5 3 ...	15	5	2	4	—	—	—	—	2
5 3 to 5 4 ...	1	15	25	10	7	4	4	2	68	5 3 to 5 4 ...	15	12	8	6	11	5	8	12	8
5 4 to 5 5 ...	3	57	83	29	8	10	7	6	203	5 4 to 5 5 ...	44	45	26	17	13	12	14	37	25
5 5 to 5 6 ...	7	90	178	72	20	37	14	8	426	5 5 to 5 6 ...	103	71	56	44	32	44	28	49	52
5 6 to 5 7 ...	5	126	295	145	40	56	34	9	710	5 6 to 5 7 ...	74	99	93	88	65	67	67	55	86
5 7 to 5 8 ...	14	170	483	234	73	105	48	26	1,153	5 7 to 5 8 ...	205	134	153	142	118	126	94	160	140
5 8 to 5 9 ...	8	210	529	281	100	115	81	26	1,350	5 8 to 5 9 ...	117	166	168	171	162	138	160	160	163
5 9 to 5 10 ...	10	196	509	266	87	139	80	25	1,312	5 9 to 5 10 ...	147	154	161	161	141	107	158	154	159
5 10 to 5 11 ...	5	177	403	196	103	131	95	23	1,133	5 10 to 5 11 ...	74	139	128	119	166	158	187	141	137
5 11 to 6 0 ...	5	111	318	179	76	95	69	18	871	5 11 to 6 0 ...	74	87	101	100	123	114	136	110	105
6 0 to 6 1 ...	6	55	174	122	51	73	40	9	530	6 0 to 6 1 ...	88	43	55	74	82	88	79	55	64
6 1 to 6 2 ...	3	28	76	53	26	32	18	7	243	6 1 to 6 2 ...	44	22	24	32	42	38	35	43	29
6 2 to 6 3 ...	—	14	48	36	16	19	7	2	142	6 2 to 6 3 ...	—	11	15	22	26	23	14	12	17
6 3 to 6 4 ...	—	7	22	9	9	9	7	—	63	6 3 to 6 4 ...	—	6	7	5	14	11	14	—	8
6 4 to 6 5 ...	—	1	5	3	—	4	1	1	15	6 4 to 6 5 ...	—	1	2	2	—	5	2	6	2
6 5 to 6 6 ...	—	—	1	1	3	3	2	1	11	6 5 to 6 6 ...	—	—	—	1	5	4	4	6	1
6 6 and upwards ...	—	3	1	1	—	—	—	—	5	6 6 and upwards ...	—	2	—	1	—	—	—	—	1
Total at each age	68	1,269	3,157	1,040	619	832	507	103	8,261	Total at each age	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Weights, from 1st January, 1894, *to 24th September*, 1898.

Weights.	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	Total at each weight.
Under 100 lbs. ...	2	5	2	1	—	—	—	—	10
100—110 lbs.... ...	2	17	12	—	—	—	1	—	32
110—120 ,, ...	9	84	76	12	7	7	5	1	201
120—130 ,, ...	16	153	197	22	34	37	18	6	483
130—140 ,, ...	12	168	248	33	56	75	42	20	654
140—150 ,, ...	11	95	218	42	78	114	63	16	637
150—160 ,, ...	6	54	133	28	39	55	37	15	367
160—170 ,, ...	3	28	64	4	18	39	25	9	190
170—180 ,, ...	—	3	18	6	7	6	12	4	56
180—190 ,, ...	1	2	4	1	4	10	2	—	24
190—200 ,, ...	—	—	2	—	—	1	2	3	8
200 lbs. and upwards	—	—	1	—	2	5	—	—	8
Total at each age	62	609	975	149	245	349	207	74	2,670

Weights.	Proportion per 1,000 at each age.								Total proportion of each weight per 1,000.
	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 44.	
Under 100 lbs. ...	32	8	2	7	—	—	—	—	4
100—110 ,, ...	32	28	12	—	—	—	5	—	12
110—120 ,, ...	145	138	78	80	29	20	24	13	75
120—130 ,, ...	258	251	202	148	139	106	87	81	181
130—140 ,, ...	194	276	254	221	229	215	203	270	245
140—150 ,, ...	177	156	224	282	318	327	304	216	239
150—160 ,, ...	97	89	136	188	159	157	179	203	137
160—170 ,, ...	49	46	66	27	73	112	120	122	71
170—180 ,, ...	—	5	19	40	29	17	58	54	21
180—190 ,, ...	16	3	4	7	16	29	10	—	9
190—200 ,, ...	—	—	2	—	—	3	10	41	3
200 lbs. and upwards	—	—	1	—	8	14	—	—	3
Total at each age ...	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Chest Measurements, from 1st January, 1889, *to 24th September*, 1898.

Chest Masurements.	16 to 17 years of age.	17 to 78.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	Total at each Chest Measurement.
Under 30 inches ...	2	11	9	2	—	—	—	—	24
30—31 inches ...	—	37	45	18	3	2	1	—	106
31—32 " ...	5	117	249	92	13	17	6	4	503
32—33 " ...	11	235	468	240	40	42	19	9	1,064
33—34 " ...	17	317	717	389	110	127	62	23	1,762
34—35 " ...	16	259	753	394	162	191	122	46	1,943
35—36 " ...	10	172	497	278	146	206	120	28	1,457
36—37 " ...	4	84	277	147	90	137	95	27	861
37—38 " ...	2	20	92	57	31	61	50	14	327
38—39 " ...	1	13	37	24	17	30	23	6	151
39—40 " ...	—	2	8	4	5	11	4	5	39
40 ins. and upwards	—	2	5	1	2	8	5	1	24
Total at each age ...	68	1,269	3,157	1,646	619	832	507	163	8,261

Chest Measurements.	Proportion per 1,000 at each age.								Total proportion of each chest measurement per 1,000.
	16 to 17 years of age.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	
Under 30 inches ...	29	9	3	1	—	—	—	—	3
30—31 inches ...	—	29	14	11	5	2	2	—	13
1—32 " ..	74	92	79	56	21	20	12	24	61
32—33 "	162	185	148	146	65	50	37	55	129
33—34 " ...	250	250	227	233	178	153	122	141	213
34—35 " ...	235	204	239	239	262	230	241	282	235
35—36 " ...	147	135	157	169	236	248	237	172	176
36—37 " ...	59	66	88	89	145	165	187	166	104
37—38 " ...	29	16	29	35	50	73	99	86	40
38—39 " ...	15	10	12	15	27	36	45	37	18
39—40 " ..	—	2	2	2	8	13	8	31	5
40 and upwards ...	—	2	2	1	3	10	10	6	3
Total at each age	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

APPENDIX XIV.

APPENDIX

Annual Abstract of Meteorological Observations taken

Netley. Lat. 50° 51′ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Air Temperature.								Tension of Vapour.	Relative Humidity.		
		Mean at 9 a.m.	Mean daily.	Means of		Abs. Min.		Abs. Max.			Per cent.	Min.	
				Min.	Max.	Temp.	Day.	Temp.	Day.		Mean.	Per cent.	Day.
January ...	29·776	36·5	36·2	30·7	41·7	16·4	18	52·1	7	·204	86	63	18
February...	30·022	44·0	43·8	37·3	50·4	27·2	17	58·7	26	·280	89	61	27
March ...	29·618	46·0	46·3	37·1	55·6	24·5	8	66·0	23	·275	79	54	13
April ...	29·758	48·4	48·7	38·5	58·9	25·0	5	73·2	28	·295	76	53	18
May ...	29·872	54·6	54·3	40·8	67·8	26·4	13	82·5	18	·327	66	39	19
June ...	29·911	64·0	63·0	50·9	75·1	43·8	17	87·3	24	·477	74	46	16
July ...	29·913	68·7	64·9	51·3	78·5	38·2	8	91·8	16	·479	62	39	30
August ...	29·757	65·8	63·9	53·0	74·9	45·2	1	86·3	4	·542	70	53	2·3
September	29·922	57·6	54·1	41·0	67·3	37·2	10	71·9	11	·415	78	48	11·19
October ...	30·052	53·9	53·3	43·2	63·5	28·5	7	72·3	28	·362	76	57	5·12
November	30·076	46·8	47·6	38·3	57·0	26·2	26	69·2	1	·306	83	65	29
December	29·852	41·8	42·0	33·8	50·2	23·4	4	64·0	16	·258	84	68	2
Year ...	29·877	52·3	51·5	41·3	61·7	16·4	18th Jan.	91·8	16th July.	·352	77	39	19May 30 July

Gibraltar. Lat. 36° 6′ 20″ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Mean at 9 a.m.	Mean daily.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity Per cent. Mean.	Min. Per cent.	Min. Day.
January ...	29·930	50·9	53·4	48·3	58·5	36·8	25	65·0	30	·311	76	48	24
February...	30·268	53·0	57·0	50·1	63·9	45·2	7	69·8	11	·350	78	43	22
March ...	30·156	58·1	60·8	53·8	67·7	48·0	4 & 5	78·2	28	·390	73	47	11
April ...	30·012	61·9	63·3	56·9	69·7	52·6	2	75·6	5	·418	70	46	9
May ...	29·938	65·8	65·9	59·7	72·1	55·0	25	77·8	20	·460	69	48	20
June ...	30·001	72·6	71·8	63·3	80·3	56·0	2	86·0	8	·532	62	42	11
July ...	29·972	75·4	75·5	66·9	84·0	60·8	4	94·0	19	·615	65	40	27
August ...	29·964	76·5	75·9	66·8	85·0	63·0	10	92·0	15	·615	64	41	16
September	30·044	70·1	69·7	60·9	78·4	43·6	19	89·0	2	·507	64	36	3
October ...	30·017	65·9	65·6	59·1	72·1	54·0	4	82·4	6	·506	76	40	6
November	30·059	60·6	60·3	54·8	65·9	49·0	25	71·4	4	·451	81	57	29
December	30·121	54·7	55·4	48·6	62·2	42·0	4 & 5	71·2	22	·357	77	50	3
Year ...	30·040	63·8	64·5	57·4	71·6	36·8	25th Jan.	94·0	19th July	·459	71	36	3rd Sep.

Malta. Lat. 35° 53′ 49″ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Mean at 9 a.m.	Mean daily.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity Per cent. Mean.	Min. Per cent.	Min. Day.
January ...	29·811	56·9	56·8	53·2	60·4	47·2	31	68·0	9	·342	70	55	9
February...	30·056	57·4	57·0	53·5	60·6	49·4	4	64·2	5·6	·358	73	49	10
March ...	29·920	59·3	58·9	54·8	63·1	49·4	10	75·8	29	·369	70	44	29
April ...	29·851	61·4	61·1	57·1	65·1	51·2	9	77·0	24	·404	72	47	4
May ...	29·730	64·9	64·7	60·6	68·8	54·8	16	75·8	30	·462	73	43	30
June ...	29·912	73·4	72·3	67·5	77·1	64·4	1	87·2	28	·596	70	45	13
July ...	29·842	79·7	79·4	74·9	83·9	71·0	31	91·4	3	·745	71	43	3
August ...	29·890	79·7	78·9	74·4	83·4	71·8	7	87·0	20	·718	69	41	20
September	29·922	78·0	77·4	72·5	82·4	66·2	28	94·6	14	·671	68	36	15
October ...	29·912	67·7	67·7	64·0	71·5	58·8	12	80·4	23	·518	73	57	11·22
November	30·098	63·5	62·8	58·9	66·7	52·2	27	75·2	17	·453	76	48	29
December	30·020	57·6	57·4	54·3	60·6	49·8	22	66·8	4	·368	76	57	1
Year ...	29·914	66·6	66·2	62·1	70·3	47·2	31st Jan.	94·6	14th Sep.	·500	72	36	15th Sep.

No. XIV.

at Netley and Stations Abroad in the Year 1897.

Long. 1° 20′ W. Height of Barometer Cistern above Sea, 47 feet.

	Rainfall.			Weather.								Wind.								
				No. of days of								No. of Observations under each Point per Month.								
Dees.	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder Storms.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
·6	3·02	·63	6	11	6	—	—		—	18		5	25	4	6	4	—	4	8	6
·5	4·27	1·85	1	15	—	—	—	3	—	20		1	6	5	6	4	16	2	12	4
·3	5·61	·98	1	21	—	—	—	2	—	13	6	2	2	—	3	10	18	10	13	4
·4	2·53	·31	16	16	—	—	—		—	13		4	14	1	10	8	9	5	7	2
·8	2·13	·65	31	10	—	—	—		2	7		7	18	2	1	7	8	4	14	1
·6	2·60	·99	8	10	—	—	1		4	13	3	4	8	—	13	5	16	4	5	5
·2	·76	·51	21	3	—	—	—		3	5		2	22	2	4	3	18	8	3	—
·3	4·57	·50	7·26	20	—	—	1		1	6		—	2	2	4	5	41	4	4	—
·7	3·01	·68	1	20	—	1	1		—	7		6	8	1	4	3	14	8	11	5
·3	·71	·36	15	6	—	—	—		3	6	—	3	18	10	6	1	10	2	8	4
·3	1·44	·31	27	12	—	—	—	3	3	15	1	2	28	7	5	6	6	—	6	—
·5	5·43	·93	7	19	—	—	—	2	5	12	2	1	15	1	5	8	26	1	2	3
·7	36·13	1·85	1st Feby.	163	6	1	3	13	21	135	26	37	166	35	67	64	182	52	93	34

Long. 5° 20′ 53″ W. Height of Barometer Cistern above Sea, 52 feet.

·1	5·93	1·34	19	12	—	—	—	—	6	7	1	—	1	8	—	2	13	13	25	—
·0	·20	·17	16	2	—	—	—	—	9	1	—	—	2	25	—	—	5	12	9	3
·0	·17	·09	14	2	—	—	—	1	17	5	—	—	—	23	—	—	5	12	18	4
·1	1·77	1·08	26	5	—	—	—	—	9	2	—	—	—	24	—	—	6	18	12	—
·2	1·84	·59	23	5	—	—	—	—	10	2	—	—	—	14	—	—	9	36	3	—
·2	—	—	—	—	—	—	—	—	23	—	—	—	2	28	—	—	13	11	2	4
·6	—	—	—	—	—	—	—	2	19	—	—	—	1	33	2	—	19	5	1	1
·6	—	—	—	—	—	—	—	—	20	—	—	—	—	24	—	—	19	16	2	1
·7	—	—	—	—	—	—	—	—	14	1	—	—	—	28	—	—	5	16	2	7
·2	3·93	1·56	31	8	—	—	—	—	7	12	—	—	2	39	—	—	6	10	1	4
·1	8·85	4·90	15	12	—	1	4	—	4	8	—	—	2	37	1	—	2	9	6	3
·7	4·89	1·92	19	9	—	—	—	—	8	7	2	—	—	22	—	—	1	9	27	3
·6	27·63	4·90	15th Nov.	55	—	1	4	3	146	45	3	—	10	305	3	2	103	167	108	30

* Anemometer broken on 1st September.

Long. 14° 30′ 54″ E. Height of Barometer Cistern above Sea, 112 feet.

·8	·90	·16	31	13	—	1	1	—	2	6	—	1	3	—	9	1	21	8	19	—
·5	·37	·14	1	6	—	—	—	—	—	7	—	—	7	9	1	3	—	10	26	—
·0	·59	·25	16	8	—	—	—	—	12	3	1	5	3	—	2	3	5	18	19	7
·5	1·88	·54	17	10	—	—	1	—	7	5	—	2	4	12	2	—	3	14	10	13
·5	1·41	·80	13	7	—	—	2	—	8	3	—	2	3	2	6	—	3	7	23	16
·0	—	—	—	—	—	—	—	—	13	—	—	5	7	2	2	—	2	7	20	15
·5	·03	·03	4	1	—	—	2	—	15	—	—	8	9	4	1	2	2	3	20	13
·0	—	—	—	—	—	—	—	—	6	—	—	6	17	1	3	1	2	4	14	14
·0	·11	·09	19	2	—	—	1	—	7	1	—	3	8	—	6	2	4	2	22	13
·0	2·83	1·41	4	12	—	—	5	—	—	8	—	1	10	1	19	1	2	1	23	4
·0	1·67	·58	23	13	—	—	1	—	—	10	—	1	21	3	20	3	—	3	9	—
·0	3·47	·58	30	19	—	—	—	—	—	12	—	—	16	4	17	1	11	—	13	—
·2	13·26	1·41	4th Oct.	91	—	1	13	—	70	55	1	34	108	38	88	17	55	77	218	95

Appendix

Annual Abstract of Meteorological Observations taken

SCUTARI CEMETERY. Lat. 41° 0′ 0″ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Air Temperature.								Tension of Vapour.	Relative Humidity.		
		Mean at 9 a.m. *	Mean daily.	Means of		Abs. Min.		Abs. Max.			Per cent.	Min.	
				Min.	Max.	Temp.	Day.	Temp.	Day.		Mean.	Per cent.	Day.
January ...	29·947	42·9	44·0	38·9	49·2	27·0	22	62·4	25	·235	79	54	25
February ...	30·027	42·4	43·1	36·3	49·9	29·0	17	62·4	28	·235	78	52	28
March ...	29·850	47·8	49·3	42·2	56·5	30·4	24	71·4	31	·276	76	45	1
April ...	29·820	56·6	57·0	48·1	65·9	40·6	28	77·0	2	·335	67	38	2
May ...	29·691	62·5	63·4	54·4	72·4	44·2	1	79·8	5	·447	72	38	1
June ...	29·782	71·3	71·6	62·5	80·7	58·0	5	89·0	21	·592	71	45	30
July ...	29·730	76·3	76·6	66·6	86·6	60·0	26, 27	94·0	5	·647	64	40	5
August ...	29·781	77·5	75·8	66·3	85·4	62·2	12	91·0	3	·598	59	37	3
September	29·896	74·2	73·9	64·7	83·1	57·0	25	95·0	22	·541	60	31	22
October ...	29·962	61·5	61·3	55·3	67·4	45·0	25	81·8	4	·420	73	42	4
November	30·236	44·6	45·1	39·9	50·3	22·8	13	59·0	30	·246	77	59	24
December	30·127	41·2	41·6	37·6	45·7	22·0	27	62·0	11	·221	81	54	30
Year ...	29·904	58·2	58·6	51·1	66·1	22·0	27th Dec.	95·0	22nd Sept.	·399	71	31	22nd Sept.

POLYMEDIA, CYPRUS. Lat. 34° 42½′ N.

January ...	29·518	56·6	57·2	47·8	66·6	40·4	4	72·7	26	·333	69	49	18
February...	29·541	57·2	56·0	45·0	67·0	36·4	18	77·1	24	·314	64	39	28
March ...	29·452	60·7	58·8	47·4	70·2	40·0	25	80·7	8	·323	58	35	19
April ...	29·421	67·6	64·5	52·1	76·9	46·8	29	89·5	19	·387	56	32	2
*May ...	29·422	72·5	68·6	56·2	81·0	50·0	1	89·7	6	·447	54	32	18, 19
June ...													
July ...													
August ...													
September													
†October ...	29·497	74·1	72·6	61·3	83·8	52·0	9	88·9	17	·465	50	36	12
November	29·606	59·4	59·8	49·0	70·5	40·8	13	80·9	6	·316	56	39	5
December	29·570	52·9	55·1	46·3	63·9	32·4	30	69·9	14	·300	68	40	4

* 20 days only. † 26 days only.

TROODOS, CYPRUS. Lat. 34° 54′ N.

January ...													
February...													
March ...													
April ...													
May ...													
June* ...	24·20	62·4	62·7	51·0	74·4	40·0	1	82·3	24. 26	·315	54	33	7
July ...	24·12	71·3	70·3	58·8	81·7	50·4	10	89·1	24	·408	50	38	2,15,16
August ...	24·11	68·6	68·5	56·3	80·7	50·2	22	87·1	30	·440	60	36	25
September	24·22	66·9	67·7	55·4	80·0	46·6	26	88·7	12	·403	56	34	20
October ...													
November													
December													

* Aneroid.

No. XIV.—*continued.*

at Netley and Stations Abroad in the year 1897.

Long. 29° 3′ 0″ E. Height of Barometer Cistern above Sea, 60 feet.

Mean amount of Cloudiness.	Rainfall.			Weather. No. of days of								Wind. No. of Observations under each Point per Month.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder Storms.	Fog.	ClearSky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
8·2	3·74	·7	29	24	5	—	—	—	1	19	—	16	16	7	5	7	4	1	—	6
6·3	2·97	·85	9	16	4	1	—	1	6	14	—	9	10	2	4	2	17	2	2	8
6·3	2·93	·18	20	11	1	1	—	3	4	10	—	3	16	3	3	11	23	—	1	2
5·4	2·04	·02	10	10	—	—	—	—	4	6	—	6	14	2	4	12	12	—	1	9
5·6	3·05	·43	5	18	—	1	9	—	6	12	—	4	9	2	3	10	21	—	1	12
4·1	3·22	·84		8	—	—	8	—	9	2	—	6	20	1	2	9	11	1	—	10
3·0	2·96	·29	17	6	—	—	6	1	13	—	—	6	30	3	1	5	10	—	1	6
2·6	2·12	·1	6	4	—	—	3	—	15	1	—	4	46	6	—	2	3	—	1	—
3·8	·67	·43	16	6	—	—	5	—	6	2	—	5	37	6	2	2	3	—	—	5
6·7	6·96	·92	8	20	—	—	3	—	1	10	—	14	29	6	—	6	3	—	1	3
6·5	3 45	·66	2	18	3	1	—	2	5	14	—	14	20	3	6	2	11	—	3	1
7·7	2·68	·65	7	16	5	—	—	2	4	19	—	17	18	11	2	4	4	1	2	3
5·5	36·79	1·92	8th Oct.	157	18	4	34	9	74	109	—	104	265	52	32	72	122	5	13	65

Long. 30° 1′ E. Height of Barometer Cistern above Sea, 460 feet.

5·0	2·49	1·16	1	7	—	—	1	—	4	2	—	6	3	8	5	—	1	7	15	17
3·7	2·54	·74	10	7	—	3	1	—	7	—	—	5	8	6	2	—	1	22	7	5
3·8	2·15	1·68	21	5	—	—	1	—	4	1	—	3	—	1	6	—	4	23	13	12
4·0	1·36	·44	12	7	—	1	3	—	5	-	—	2	—	1	1	1	1	27	2	25
4·5	·35	·35	1	1	—	—	—	—	2	1	—	—	—	—	—	1	—	12	4	15‡
3·5	·53	·25	25	4	—	—	—	—	6	—	—	4	1	—	4			5	25	12
4·5	3·27	1·12	9	11	—	—	1	—	7	2	—	6	6	6	6			3	18	13
4·5	3·41	1·06	1	13	2	—	1	—	2	3	—	1	14	3	3				20	21

‡ Wind observations 16 days only.

Long. 32° 53′ E. Height of Barometer Cistern above Sea, 5,700 feet.

2·2	·49	·22	17	4	—	—	—	1	17	—	—		1					14	5	37
2·5	·78	·64	9	2	—	1	—	—	7	—	—		—					12	3	47
2·6	—	—	—	—	—	—	—	—	7	—	—	4	—					5	4	49
2·1	—	—	—	—	—	—	—	1	15	—	—	3	—			2	1	4	1	48

Appendix

Annual Abstract of Meteorological Observations taken

Fort Napier, Natal. Lat. 29° 3′ S.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Air Temperature.								Tension of Vapour.	Relative Humidity.		
		Mean at 9 a.m.	Mean daily.	Means of		Abs. Min.		Abs. Max.			Per cent.	Min.	
				Min.	Max.	Temp.	Day.	Temp.	Day.		Mean.	Per cent.	Day.
January ...	27·615	74·1	72·5	60·9	84·2	54·2	1	98·6	10	·586	67	39	31
February...	27·677	75·2	73·6	61·7	85·6	56·2	20, 28	100·0	15	·585	62	40	1, 5
March ..	27·617	71·8	71·7	60·3	83·1	52·2	2	95·5	7	·550	64	36	13
April ...	27·743	72·7	71·6	58·1	85·1	43·0	27	99·0	7	·529	60	36	7
May ...	27·760	67·3	64·3	50·1	78·5	41·8	31	86·4	13	·483	62	43	26
June ...	27·915	62·6	58·6	41·9	72·3	36·8	13	86·0	23	·432	68	42	5
July ...	27·748	59·9	60·6	44·3	76·9	36·6	16	87·0	18, 31	·333	52	32	31
August ...	27·825	63·3	64·7	49·4	80·0	38·5	3	94·8	23	·353	51	34	11, 14, 18, 21, 23
September	27·723	68·7	67·2	52·4	82·1	37·8	18	102·6	8	·463	57	33	4, 7
October ...	27·645	71·8	69·7	57·8	81·7	51·4	3, 4	104·6	1	·525	62	35	25
November	27·576	76·6	71·4	57·2	85·7	44·5	5	111·8	23	·487	52	33	2
December	27·597	76·8	75·7	62·0	89·4	51·6	24	106·0	28	·540	52	33	5
Year ...	27·703	70·1	68·5	54·9	82·0	36·6	16th July.	111·8	23rd Nov.	·489	59	32	31st July

Sierra Leone. Lat. 8° 29′ 30″ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Mean at 9 a.m.	Mean daily.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity Per cent. Mean.	Relative Humidity Min. Per cent.	Relative Humidity Min. Day.
January ...	29·667	79·8	81·3	73·0	89·6	67·8	10th	93·6	19th	·727	64	34	3rd
February ...	29·689	81·9	81·5	74·8	88·3	70·4	16th	92·0	9th	·790	67	39	26th
March ...	29·652	84·6	81·5	76·6	86·4	73·4	17th	89·2	3rd	·800	64	42	4th
April ...	29·670	85·0	82·3	76·2	88·4	70·0	26th	92·0	19, 28th	·838	67	58	8, 15, 16, 29
May ...	29·677	84·8	80·1	74·9	85·3	68·7	29th	89·4	28th	·840	69	55	29th
June ...	29·751	83·5	78·7	74·0	83·5	68·0	29th	88·2	21st	·858	74	62	22nd
July ...	29·748	78·6	76·2	73·0	79·4	69·0	6, 23rd	84·0	4th	·822	80	63	20th
August ...	29·740	77·9	76·0	73·1	79·0	71·0	20, 28th	85·7	29th	·835	86	62	30th
September	29·737	79·7	76·9	73·2	80·7	69·0	23rd	85·6	30th	·837	80	62	30th
October ...	29·703	82·0	78·0	73·2	82·9	66·3	19th	88·6	27th	·823	73	61	19,22
Novemter	29·665	81·9	78·3	73·2	83·4	68·5	11th	86·2	14th	·811	71	39	22nd
December	29·700	81·8	78·7	74·4	83·0	70·0	11, 31st	87·0	20th	·780	68	34	30th
Year ...	29·700	81·8	79·1	74·1	84·2	66·8	19th Oct.	93·6	19th Jan.	·813	72	34	3 Jan 30 Dec

Barbados. Lat. 13° 7′ 39″ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Mean at 9 a.m.	Mean daily.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity Per cent. Mean.	Relative Humidity Min. Per cent.	Relative Humidity Min. Day.
January ...	30·042	81·3	76·5	66·2	86·9	64·0	26	89·0	11, 12	·747	67	52	19
February...	30·139	80·1	74·9	64·2	85·7	60·0	3	87·0	24	·691	64	45	8
March ...	30·037	80·8	75·5	64·4	86·6	59·8	19	89·0	10	·736	67	51	19
April ...	30·069	83·1	77·4	66·7	88·1	64·8	17	90·0	18	·700	61	48	18
May ..	30·028	83·0	77·5	67·3	87·7	63·6	17	89·6	2	·771	66	51	3
June ...	30·081	82·6	77·0	67·4	86·7	64·0	2	88·4	22	·767	67	52	7
July ...	30·062	83·2	77·6	66·7	88·5	64·2	25	90·4	21	·793	68	55	3
August ...	30·044	83·3	77·4	67·0	87·9	64·4	10	89·4	22	·823	69	55	5
September	30·044	83·8	77·5	66·2	88·9	62·8	17	91·4	17	·810	67	55	15
October ...	30·003	83·7	77·2	66·1	88·4	61·8	3	89·6	17, 27	·822	70	55	1
November	29·990	81·7	75·5	64·5	86·6	62·2	7	90·8	6	·788	71	58	1
December	29·548	80·3	74·5	63·8	85·2	57·8	17	87·4	13	·787	72	60	20
Year ...	30·007	82·2	76·5	65·9	87·3	57·8	17th Dec.	91·4	17th Sept.	·770	67	45	8th Feb.

No. XIV.—*continued.*

at Netley and Stations Abroad in the Year 1897.

Long. 30° 2′ E. Height of Barometer Cistern above Sea, 2,220 feet.

Mean Amount of Cloudiness.	Rainfall.			Weather.								Wind.								
				No. of days of								No. of Observations under each Point per Month.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder storms.	Fog.	ClearSky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
5·8	7·73	1·74	26	16	—	1	6	—	3	10	—	—	1	4	2	1	—	—	—	54
4·8	4·20	1·64	1	14	—	—	2	—	3	6	—	—	—	3	1	—	2	—	—	50
5·5	8·04	1·74	19	15	—	1	3	—	6	5	—	—	—	2	—	—	—	—	—	60
3·4	1·92	·68	22	9	—	—	4	—	12	3	—	—	1	—	—	—	—	—	—	59
2·2	·38	·36	4	2	—	—	—	—	17	3	—	—	—	1	—	—	—	—	—	61
2·9	1·72	1·61	8	5	—	—	—	—	10	4	—	—	—	—	1	—	6	—	—	53
1·9	—	—	—	—	—	—	—	—	17	1	—	—	—	—	—	—	4	1	—	57
4·3	·56	·16	23	8	—	—	—	—	8	6	—	—	1	—	1	—	1	2	1	56
3·7	1·97	·79	9	7	—	—	1	—	12	5	1	1	—	4	1	—	1	—	4	49
5·6	4·23	1·02	27	17	—	—	3	—	7	11	—	—	—	2	2	1	1	1	—	55
5·7	·68	·19	4	10	—	—	1	—	1	8	—	—	2	2	—	—	2	—	—	54
6·3	3·37	·59	7	19	—	—	2	—	1	11	—	1	1	1	—	—	—	2	—	57
4·3	34·80	1·74	26Jan. 19 Mar.	122	—	2	22	—	97	73	1	2	6	19	8	2	17	6	5	665
Long. 13° 9′ 17″ W. Height of Barometer Cistern above Sea 224 feet.																				
1·9	—	—	—	—	—	—	1	—	12	—	—	9	5	13	4	3	—	11	3	14
2·1	4·21	4·21	16th	1	—	—	1	—	9	—	—	4	3	6	1	2	1	20	10	9
2·0	·10	·05	9,16	2	—	—	2	—	8	—	—	7	—	8	—	1	2	31	5	8
2·3	6·76	2·75	10th	7	—	—	9	—	3	—	—	5	1	8	—	4	2	26	3	11
2·5	15·68	2·87	4th	20	—	—	22	—	—	—	—	2	1	18	—	3	—	24	4	10
2·4	12·63	2·57	23rd	21	—	—	15	—	—	—	—	1	—	14	—	4	3	27	2	9
2·4	28·26	2·01	8th	28	—	—	4	—	—	—	—	—	1	2	—	2	6	31	4	16
2·6	55·35	7·39	15th	28	—	—	6	—	—	—	—	—	—	4	—	—	4	36	2	16
2·6	24·64	5·12	14th	19	—	—	10	—	—	—	—	—	—	11	—	3	3	22	2	19
2·6	10·53	1·51	11, 18	18	—	—	22	—	—	—	—	—	—	22	4	1	4	21	1	9
2·5	5·41	1·68	4th	10	—	—	14	—	4	—	—	—	1	20	1	3	1	17	1	16
2·3	·74	·61	7th	3	—	—	2	—	2	—	—	—	2	15	3	3	1	11	1	26
2·3	164·31	7·39	15th Aug.	157	—	—	108	—	38	—	—	28	14	141	13	29	27	277	38	163
Long. 59° 40′ 8″ W. Height of Barometer Cistern above Sea 30⅔ feet.																				
4·7	3·09	1·05	5	21	—	—	—	—	—	2	—	—	31	9	10	3	—	—	—	9
4·6	1·15	·38	28	20	—	—	—	—	2	—	—	—	48	1	—	—	—	—	—	7
4·0	2·21	·70	1	15	—	—	—	—	6	1	—	—	51	5	6	—	—	—	—	—
4·5	·50	·16	1	10	—	—	—	—	—	—	—	—	34	14	12	—	—	—	—	—
5·4	6·12	2·06	25	19	—	—	—	—	—	1	—	—	24	11	27	—	—	—	—	—
6·0	4·21	1·29	21	19	—	—	—	—	—	4	—	—	39	13	8	—	—	—	—	—
5·4	5·58	·95	1	25	—	—	1	—	—	1	—	—	38	8	15	—	—	—	—	1
5·9	6·00	1·10	27	29	—	—	—	—	—	2	—	—	34	13	12	—	—	—	—	3
5·3	3·70	1·18	25	21	—	—	1	—	—	3	—	—	27	9	13	—	—	—	—	11
5·7	6·63	2·65	5	24	—	—	—	—	1	2	—	—	25	12	11	—	—	—	—	14
6·0	6·67	1·16	6	22	—	—	—	—	—	4	—	—	34	6	10	—	—	—	1	9
6·1	6·98	1·68	26	23	—	—	—	—	4	1	—	—	42	5	4	—	—	—	—	11
5·3	52·84	2·65	5th Oct.	248	—	—	2	—	13	21	—	—	427	106	128	3	—	—	1	65

Appendix

Annual Abstract of Meteorological Observations taken

Up Park Camp, Jamaica. Lat. 17° 59′ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Air Temperature.								Tension of Vapour.	Relative Humidity.		
		Mean at 9 a.m.	Mean daily.	Means of		Abs. Min.		Abs. Max.			Per cent.	Min.	
				Min.	Max.	Temp.	Day.	Temp.	Day.		Mean.	Per cent.	Day.
January ...	29·769	80·9	78·9	66·0	91·8	60·5	10	98·0	1	·593	52	39	15, 16
February ...	29·805	83·7	81·5	69·4	93·6	66·1	10	97·8	24	·656	54	43	22, 28
March ...	29·790	81·1	80·3	69·0	91·7	65·5	12	95·8	17	·687	57	40	15
April ...	29·756	85·9	81·5	71·4	91·6	69·7	2	96·2	12	·723	58	42	6,12,13
May... ...	29·720	86·2	82·3	73·2	91·5	70·5	18	93·8	6, 25	·779	63	51	9, 14
June ..	29·750	88·3	83·5	73·7	93·3	72·1	22	97·6	24	·733	55	41	29
July ...	29·750	87·8	83·7	73·8	93·6	71·1	17	98·6	23	·744	57	36	12
August ...	29·759	87·8	83·9	74·0	93·8	71·5	10	99·6	10	·771	59	44	5
September ..	29·736	85·9	82·9	73·1	92·7	70·9	27	96·4	13	·792	66	45	6
October ...	29·691	82·9	80·6	71·5	89·7	69·5	24	95·0	13, 14	·826	74	54	7
November ...	29·729	83·9	81·6	70·1	93·1	65·9	30	97·2	8	·763	65	43	26
December ...	29·752	84·4	81·4	68·7	94·2	65·9	1	98·2	24	·708	57	41	23
Year ...	29·751	85·1	81·8	71·2	92·5	60·5	10th Jan.	99·6	10th Aug.	·731	60	36	12th July

Newcastle, Jamaica. Lat. 18° 0′ 6″ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Mean at 9 a.m.	Mean daily.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity Per cent. Mean.	Min. Per cent.	Min. Day.
January ...	26·305	68·5	61·9	48·6	75·3	42·6	9	82·4	20, 24	·458	65	42	26
February ...	26·310	71·2	65·0	50·7	79·4	49·0	3, 4	84·2	16	·477	61	45	6, 19
March ...	26·254	71·0	64·8	51·3	78·3	49·0	11	83·4	21	·483	62	41	21
April ...	26·409	73·7	68·5	59·0	78·1	50·6	2	84·8	3	·543	68	41	2
May ..	26·427	74·5	69·9	61·7	78·1	59·9	6	81·9	13	·592	74	53	21
June ...	26·477	75·3	72·2	62·2	82·2	61·0	13, 18, 23, 24	90·9	22	·588	67	43	24
July ...	26·497	74·5	71·7	62·5	81·0	60·9	17	86·3	13	·600	70	53	25
August ..	26·522	75·2	71·3	62·5	80·2	60·8	15	87·6	10	·595	69	50	17
September ...	26·527	73·8	71·3	62·7	80·0	60·9	27	86·8	10	·591	70	51	18
October ...	26·496	73·6	70·4	61·7	79·1	60·0	16	84·9	5	·619	78	58	3
November ...	26·501	73·4	70·3	60·8	79·8	57·0	29	82·4	18	·550	68	50	6
December ...	26·523	72·3	69·5	60·6	78·5	57·4	7	85·2	12	·515	65	48	2, 23
Year ...	26·446	73·1	68·9	58·7	79·2	42·6	8th Jan.	90·9	22nd June.	·551	68	41	21st Mar., 2nd April.

St. Lucia. Lat. 14° 0′ 13″ N.

Month.	Mean Pressure—Corrected and reduced to 32° Fahrenheit.	Mean at 9 a.m.	Mean daily.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity Per cent. Mean.	Min. Per cent.	Min. Day.
January ...	29·176	77·1	76·9	70·9	82·3	69·0	22, 30	86·4	18	·731	79	60	14, 30
February ...	29·160	77·0	75·8	69·6	82·0	67·0	27	84·8	1	·646	69	53	3, 13
March ...	29·184	77·1	76·0	69·9	82·1	67·0	18	84·6	24	·665	69	53	29
April ...	29·214	79·2	77·8	71·7	83·9	68·0	19	86·5	25	·679	68	55	28
May ..	29·195	78·5	77·1	71·2	83·0	69·0	30	85·5	24	·749	77	60	8
June ...	29·249	79·0	77·6	72·4	82·8	69·5	2	84·5	23, 25	·735	74	64	23
July ...	29·231	79·4	78·1	72·1	84·1	69·0	30	86·6	21	·732	74	59	13
August ...	29·216	79·7	78·9	73·4	84·4	71·4	9	87·0	31	·762	77	62	5
September ...	29·214	81·4	79·6	73·6	85·7	71·4	19	88·6	8	·760	72	60	6 22
October ...	29·174	80·9	79·2	73·2	85·3	71·0	5	89·0	3	·755	73	57	15
November ...	29·151	78·4	77·0	71·4	82·7	69·0	22, 23	84·4	12	·738	78	63	19
December ...	29·185	77·7	76·2	70·4	82·0	68·6	6	84·4	18	·702	76	59	16
Year ...	29·196	78·8	77·5	71·6	83·4	67·0	27th Feb., 18th Mar.	89·0	3rd Oct.	·721	74	53	3rd, 13th Feb., 29th Mar.

No. XIV.—*continued.*

at Netley and Stations Abroad in the Year 1897.

Long. 76° 56′ W. Height of Barometer Cistern above Sea, 245 feet.

Mean Amount of Cloudiness.	Rainfall.			Weather.								Wind.								
				No. of days of								No. of Observations under each Point per Month.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder storms.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
2·5	—	—	—	—	—	—	—	—	3	1	—	5	10	—	23	4	11	3	3	3
4·0	—	—	—	—	—	—	—	—	2	—	—	2	2	—	29	3	8	5	3	4
3·9	—	—	—	—	—	—	—	—	—	—	—	—	1	1	30	7	16	3	2	2
4·2	1·09	·50	13	7	—	—	—	—	1	—	—	1	3	—	40	4	8	1	2	1
5·0	3·55	1·10	29	11	—	—	2	—	—	—	—	—	11	—	31	3	13	1	3	—
4·5	·50	·33	5	4	—	—	1	—	—	1	—	—	4	—	46	—	5	—	3	2
5·8	1·69	·56	19	11	—	—	2	—	—	7	—	—	9	—	37	—	7	—	8	1
5·5	3·27	1·05	23	11	—	—	—	—	—	1	—	—	14	—	32	—	11	1	4	—
5·7	8·65	5·04	26	15	—	—	—	—	—	1	—	—	16	—	28	—	12	1	3	—
5·9	25·34	7·20	16	19	—	—	1	—	2	8	—	—	9	—	37	—	7	2	7	—
4·6	1·97	·76	12	9	—	—	—	—	—	—	—	—	16	—	28	—	7	—	9	—
3·5	·21	·07	11	4	—	—	—	—	—	—	—	4	8	3	24	1	11	4	7	—
4·6	46·27	7·20	16th Oct.	91	—	—	6	—	8	19	—	12	103	4	385	22	116	21	54	13
Long. 76° 0′ 42″ W. Height of Barometer Cistern, above Sea. 3,800 feet.																				
3·4	·82	·31	8	7	—	—	—	—	4	—	—	3	3	1	2	—	—	—	14	39
3·7	·10	·06	20	4	—	—	—	—	3	—	—	2	5	1	3	—	—	—	3	42
5·1	2·27	1·80	27	13	—	—	—	—	—	3	—	6	—	—	—	—	—	—	—	56
5·5	6·93	1·60	24, 26	17	*—	—	—	—	—	1	—	5	3	3	4	1	1	1	4	38
6·0	14·17	2·24	16	27	—	—	3	—	—	3	—	5	5	4	6	—	1	—	—	41
5·5	3·75	1·84	1	7	—	—	2	—	—	2	—	—	5	2	18	—	—	—	3	32
6·0	4·09	1·82	5	18	—	—	3	—	—	1	—	4	4	4	10	—	—	—	1	39
5·0	3·74	1·12	12	12	—	—	2	—	—	1	—	—	3	4	20	—	—	—	3	32
6·0	13·42	3·59	14	17	—	—	3	—	—	1	—	1	8	5	26	1	—	—	3	16
7·0	25·61	8·82	16	20	—	—	1	2	—	7	—	—	2	2	37	2	—	—	—	19
5·6	11·40	3·28	20	16	—	—	—	—	1	2	—	8	5	2	1	—	—	1	6	37
5·1	5·51	3·10	18	10	—	—	—	—	2	3	—	—	3	—	—	—	—	—	1	58
5·3	91·81	8·82	16th Oct.	168	—	—	14	2	10	24	—	34	46	28	127	4	2	2	38	449
Long. 61° 0′ 25″ W. Height of Barometer Cistern above Sea, 744 feet.																				
4·1	*	—	—	20	—	—	—	1	—	4	—	2	34	18	6	—	—	—	—	2
3·6	4·18	·63	3	20	—	—	—	—	—	3	—	—	38	18	—	—	—	—	—	—
3·9	5·80	1·20	7	22	—	—	—	—	—	5	—	2	44	8	4	—	3	—	1	—
3·9	1·88	·50	1	9	—	—	—	1	—	4	—	—	42	12	—	—	—	—	—	6
5·0	18·91	3·00	19	31	—	—	—	1	—	10	—	—	42	10	9	—	—	—	—	1
4·5	8·90	1·90	27	25	—	—	—	—	—	9	—	—	54	4	—	—	—	—	—	2
4·5	12·79	1·45	30	28	—	—	2	—	—	8	—	1	41	9	6	—	—	—	—	5
5·9	13·67	2·77	8	26	—	—	—	—	—	3	—	—	43	9	6	—	—	—	—	4
4·5	6·92	1·54	9	20	—	—	3	—	—	4	—	—	33	18	9	—	—	—	—	—
4·8	12·29	2·46	23	25	—	—	2	—	1	5	—	—	24	19	17	—	—	—	—	2
5·4	11·41	2·28	22	24	—	—	—	—	—	1	—	—	23	21	10	—	—	—	—	6
5·5	10·33	1·25	5	22	—	—	—	1	1	4	—	3	27	18	5	—	—	—	—	9
4·6	—	—	—	272	—	—	7	4	2	60	—	8	445	164	72	—	3	—	1	37

* Rain gauge out of repair 14th to 19th January.

Appendix

Annual Abstract of Meteorological Observations taken

BERMUDA. Lat. 32° 17′ 40″ N.

Month.	Mean pressure — Corrected and reduced to 32° Fahrenheit.	Air Temperature.								Tension of Vapour.	Relative Humidity.		
		Mean at 9 a.m.	Mean daily.	Means of		Abs. Min.		Abs. Max.			Per cent.	Min.	
				Min.	Max.	Temp.	Day.	Temp.	Day.		Mean.	Per cent.	Day.
January ...	29·896	62·6	61·8	57·6	66·1	52·0	13	72·1	5	·498	84	69	24
February ...	29·949	63·1	62·1	57·6	66·7	50·2	15	73·5	27	·505	82	66	1, 6
March ...	29·969	65·1	63·7	58·9	68·6	50·0	29	74·5	10	·546	83	68	6
April ...	20·987	66·7	65·8	60·3	70·7	53·0	2	77·5	19	·573	82	64	29
May... ...	29·963	72·3	70·3	65·0	75·7	57·8	10	80·1	30	·634	76	57	10, 11
June ...	29·944	77·0	74·9	69·4	80·4	62·0	16, 28	83·5	25	·792	82	62	15
July ...	30·006	80·8	77·8	72·2	83·4	66·8	6	86·9	30	·842	77	63	20
August ...	29·983	82·7	79·3	72·8	85·9	69·0	9	87·9	30	·909	78	66	17
September...	29·964	79·5	77·2	71·6	82·9	67·0	30	87·3	24	·755	71	56	17
October ...	29·878	75·5	73·1	68·4	77·8	64·0	19	82·5	6	·708	78	61	19
November...	29·992	69·3	68·4	64·0	72·8	58·2	20, 22	80·1	3	·555	74	56	27
December...	29·998	66·2	66·4	62·2	70·7	51·8	25	75·5	14, 27	·512	76	59	7,8,16
Year ...	29·961	71·7	70·1	65·0	75·1	50·0	29 Mar	87·9	30 Aug.	·652	79	56	17 Sept. 27 Nov.
FORT CANNING, SINGAPORE.										**Lat. 1° 16′ N.**			
January ...	29·760	80·9	79·3	73·4	85·3	71·0	25	92·0	29	·891	78	64	29
February ...	29·725	79·6	80·4	73·7	87·1	71·0	14,18,21,	92·0	2, 7	·876	81	63	26
March ...	29·735	82·9	83·0	74·1	92·0	71·2	20	93·0	31	·902	76	66	4, 13, 18
April ...	29·724	82·3	82·2	74·4	90·1	72·2	11	93·4	13	·911	77	67	13, 21, 29
May... ...	29·707	83·8	82·2	75·4	89·0	74·0	10,12,17, 19, 21	92·4	12	·903	76	62	25
June ...	29·702	83·2	82·8	75·8	89·8	72·4	20	93·0	22	·898	75	62	22
July ...	29·745	79·9	82·7	75·9	89·6	70·0	23	93·0	9	·900	76	65	8
August ...	29·738	83·2	82·9	75·9	89·9	72·0	27, 30	98·0	11	·896	75	64	21
September...	29·769	82·4	80·6	74·1	90·4	70·2	28	94·6	15, 16	·891	75	65	17
October ...	29·737	82·5	81·3	74·2	88·4	71·0	19	94·6	1	·848	75	52	12, 18, 21
November...	29·722	81·1	81·5	74·0	89·0	71·4	25	93·4	5	·770	74	60	20
December...	29·804	80·8	79·5	73·6	85·4	70·0	27	90·8	7	·772	75	52	28
Year ...	29·739	81·9	81·6	74·5	88·8	70·0	23 July 27 Dec.	98·0	11th Aug.	·871	76	52	12, 18, 21 Oct. 28th Dec.

No. XIV.—*continued.*

at Netley and Stations Abroad in the year 1897.

Long. 64° 47′ W. Height of Barometer Cistern above Sea, 151 feet.

Mean Amount of Cloudiness.	Rainfall.			Weather.								Wind.								
				No. of days of								No. of Observations under each Point per Month.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder Storms	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
7·6	4·79	1·02	27	21	—	—	1	—	—	15	—	8	6	—	5	4	15	5	13	6
7·1	3·02	1·40	2	16	—	—	3	—	1	10	—	8	2	1	2	14	15	4	8	2
7·0	2·49	·84	27	10	—	—	1	—	—	11	—	8	3	4	5	8	14	8	10	2
6·6	4·79	2·10	22	13	—	—	—	—	1	10	—	15	2	1	7	21	8	—	5	1
4·9	6·86	1·80	31	13	—	—	2	—	6	4	—	4	1	8	27	6	7	1	5	3
7·4	7·84	1·66	14	21	—	—	2	—	—	12	—	1	2	1	—	21	29	1	4	1
5·2	5·93	2·18	2	11	—	—	—	—	2	5	—	—	7	8	7	21	15	—	—	4
4·9	7·34	2·04	8	14	—	—	4	—	2	3	—	—	—	2	5	24	19	1	—	11
6·3	3·38	·92	27	13	—	—	—	—	—	4	—	13	11	6	9	8	5	2	1	5
5·9	7·50	2·70	25	19	—	—	3	—	3	9	—	9	18	4	6	5	9	3	2	6
5·6	1·49	·47	5	16	—	—	—	—	1	7	—	9	14	4	—	8	5	5	8	7
5·6	3·97	1·73	28	14	—	—	1	—	1	7	—	—	7	8	1	8	7	4	10	17
6·2	59·40	2·70	25 Oct.	181	—	—	17	—	17	97	—	75	73	47	74	148	148	34	66	65

Long. 103° 53′ E. Height of Barometer Cistern above Sea, 110 feet.

6·0	3·61	·85	31*	17	—	—	1	—	—	10	—	8	22	—	—	—	—	—	9	23
7·0	17·61	5·65	18	17	—	—	5	—	—	20	—	—	9	—	—	—	—	—	12	35
6·7	8·78	1·70	16,23	14	—	—	9	—	—	13	—	3	12	1	—	—	—	—	20	26
5·7	9·32	2·00	7	14	—	—	7	—	—	10	—	1	9	—	—	—	2	1	27	20
6·7	10·79	1·85	9	20	—	—	6	—	—	12	—	1	—	—	2	2	16	7	13	21
6·3	6·92	1·84	30	15	—	—	1	—	—	10	—	—	—	—	—	3	16	22	2	17
7·0	6·56	1·85	23	11	—	—	3	—	—	16	—	—	—	—	1	12	16	16	—	17
6·5	7·48	2·50	29	17	—	—	4	—	—	14	—	1	—	—	1	16	24	12	—	8
6·5	*	*	—	12	—	—	3	—	—	9	—	—	—	—	—	7	15	11	—	27
7·5	*	*	—	14	—	—	3	—	—	16	—	—	1	—	—	3	26	23	2	7
7·7	*	*	—	13	—	—	4	—	—	21	—	—	—	—	—	3	23	19	1	14
7·7	*	*	—	11	—	—	4	—	—	19	—	1	3	—	3	3	20	18	1	13
6·8	—	—	—	175	—	—	50	—	—	170	—	15	56	1	7	49	158	129	87	228

* Rain gauge stolen on 24th September.

Appendix

Annual Abstract of Meteorological Observations taken

HONG KONG. Lat. 22° 16′ 20″ N.

Month.	Mean Pressure — Corrected and reduced to 32° Fahrenheit.	Air Temperature.								Tension of Vapour.	Relative Humidity.		
		Mean at 9 a.m.	Mean Daily.	Means of		Abs Min.		Abs. Max.			Per cent.	Min.	
				Min.	Max.	Temp.	Day	Temp.	Day		Mean.	Per cent.	Day.
January ...	30·015	65·2	65·2	60·3	70·1	48·5	18, 19	78·5	29	·524	81	62	4
February ...	30·120	55·3	56·3	52·7	59·9	42·0	11	76·5	1	·402	86	62	12
March ...	30·009	65·8	66·4	61·7	71·0	56·0	13, 14, 21	86·0	28	·584	86	66	16
April ...	29·966	70·9	71·5	66·4	76·6	58·0	19	86·5	25	·658	81	64	21
May ..	29·812	82·1	82·2	77·1	87·2	68·0	1, 2	94·0	18	·912	80	69	17
June ...	29·674	84·4	84·1	79·9	88·2	73·0	30	92·5	2	·968	81	69	1
July ...	29·693	85·0	84·6	79·7	89·5	75·0	2, 3	93·0	24	·927	74	65	15, 16
August ...	29·785	82·8	82·1	76·6	87·6	72·0	31	93·5	8	·952	84	65	8, 28
September	29·614	84·1	83·9	78·6	89·2	74·0	18	99·0	7	·887	73	56	23
October ...	29·988	79·6	79·2	74·6	83·8	69·0	24	91·0	12	·748	72	48	1
November ...	30·121	72·3	72·9	68·8	77·1	54·0	24, 25, 26	89·5	5	·610	70	44	28
December ...	30·151	61·2	63·1	58·3	67·9	52·0	25	72·0	9	·426	72	51	2
Year ...	29·908	74·1	74·3	69·6	79·0	42·0	11 Feb.	99·0	7 Sept.	·716	78	44	28 Nov.

SANITARIUM, HONG KONG. Lat. 22° 16′ 20″ N.

January ...													
February ...													
March ...													
April ...													
*May ..	--		79·7	74·3	85·1	67·5	27	89·5	31	—	—	—	—
June ...	--	-	77·9	71·4	84·3	64·5	2, 9, 30	88·5	15	--	—	—	—
July ..	--	-	79·6	73·6	85·6	65·5	2	89·5	24	—	—	—	—
August ...	-	-	79·1	74·1	84·0	64·5	10	91·5	8	—	—	...	—
September ...	—	—	79·5	73·7	85·3	63·5	18	90·5	24	--	—	—	—
†October ..	--	--	74·9	70·6	79·1	65·5	25	86·0	13	--	--	--	—
November													
December .													

* 12 days only. † 25 days only.

No. XIV.—*continued.*

at Netley and Stations Abroad in the Year 1897.

Long. 114° 8′ 16″ E. Height of Barometer Cistern above Sea, 18 feet.

Mean Amount of Cloudiness.	Rainfall.			Weather. Number of Days of								Wind. No. of Observations under each Point per Month.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder Storms.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W	W.	N.W.	Calm.
7·3	2·01	1·35	11	8	—	—	—	—	5	18	—	3	2	48	1	—	1	2	—	5
8·5	1·54	·50	5	15	—	—	—	—	3	23	—	4	11	25	—	—	3	5	1	7
8·6	·88	·34	20	7	—	—	—	—	—	21	—	1	5	49	1	—	—	—	—	6
7·3	2·85	1·35	17	11	—	—	1	—	4	16	—	—	4	38	—	—	—	2	2	14
6·8	18·67	9·50	8	13	—	—	4	—	2	10	—	—	4	13	4	7	15	1	1	17
8·0	27·42	5·31	27	29	—	—	7	—	—	14	—	—	7	11	5	6	22	—	—	9
5·9	7·13	1·84	31	19	—	—	—	—	2	5	—	—	—	9	16	17	12	1	4	3
6·6	27·01	5·70	2	21	—	—	5	—	—	—	—	—	7	5	11	3	15	2	—	19
3·5	8·46	4·33	17	11	—	—	1	—	—	—	—	—	12	1	5	1	14	—	6	21
2·8	6·81	2·18	6	9	—	—	—	—	3	6	—	—	5	—	4	—	12	—	20	21
3·1	9·45	7·20	16	6	—	—	—	—	10	5	—	1	12	—	—	—	10	—	9	28
3·8	·38	·14	15	4	—	—	—	—	8	6	—	—	13	—	4	—	7	—	15	23
6·0	112·61	9·50	8 May	153	—	—	18	—	37	124	—	9	82	199	51	34	111	13	8	173

Long. 114° 9′ 16″ E. Height of Barometer Cistern above Sea, 911 feet.

6·6	6·81	3·30	21	9	—	—	1	—	—	4	—	—	3	1	2	—	6	—	—	12
7·5	22·8	4·32	28	25	—	—	6	—	—	10	—	—	5	7	2	10	23	—	—	13
7·3	5·46	1·58	5	18	—	—	1	—	—	13	—	—	7	1	5	[illegible]	28	—	—	14
7·9	28·02	4·80	3	18	—	—	5	—	—	16	—	—	4	1	2	5	27	1	1	21
6·4	7·27	3·30	18	10	—	—	1	—	1	8	—	—	26	5	6	—	15	—	1	7
7·2	7·24	2·34	7	11	—	—	—	—	2	13	—	—	41	3	—	—	—	—	—	5

Observation for wind was only taken at 3 p.m. on 25th October.

Summary of Results of Meteorological Obse

Stations.	Altitude above Sea Level.	Latitude.	Longitude.	Mean Daily Air Temp.	Air Pressure—corrected and reduced to 32° F.	Air Temperature.							Tension of Vapour.	Relative H	
							Means of		Abs. Max.		Abs. Max.			Per Cent	
						Mean, 9 a.m.	Min.	Max.	T. mp.	Date.	Temp.	Date.		Mean.	Per cent.
editerranean:	ft.	° ′ ″	° ′ ″												
Gibraltar ...	52	36 6 20 N.	5 20 53 W.	64·5	30·040	63·8	57·4	71·6	36·8	23 Jan.	94·0	19 July	·459	71	36
Malta ...	112	35 53 49 N.	14 30 54 E.	66·2	29·914	66·6	62·1	70·3	47·2	31 Jan.	94·6	14 Sept.	·500	72	36
Scutari ...	60	41 0 0 N.	29 3 0 E.	58·6	29·904	58·2	51·1	66·1	22·0	27 Dec.	95·0	22 Sept.	·339	71	31
Cyprus : Polymedia	460	34 42½ 0 N.	30 1 0 E.												
Mt. Troodos	5,700	34 54 0 N.	32 53 0 E.												
atal, Fort Napier.	2 220	29 3 0 S.	30 2 0 E.	68·5	27·703	70·1	54·9	82·0	36·6	16 July	111·8	23 N v.	·489	59	32
erra Leone ...	224	8 29 30 N.	13 9 17 W.	79·1	29·700	81·8	74·1	84·2	66·8	19 Oct.	93·6	19 Jan.	·813	72	34
est Indies· Barbados ...	30⅓	13 7 39 N.	59 40 8 W.	76·5	30·007	82·2	65·9	87·3	57·8	17 Dec.	91·4	17 Sept.	·770	67	45
maica : Up Park Camp.	245	17 59 0 N.	76 56 0 W.	81·8	29·751	85·1	71·2	92·5	60·5	10 Jan.	99·6	10 Aug.	·731	60	36
Newcastle ..	3,800	18 0 6 N.	76 0 42 W.	68·9	26·446	73·1	58·7	79·2	42·6	8 Jan.	90·9	22 June	·551	68	41
. Lucia ...	744	14 0 13 N.	61 0 25 W.	77·5	29·196	78·8	71·6	83·4	67·0	27 Feb. 18 Mar.	89·0	3 Oct.	·721	74	53
rmuda ...	151	32 17 40 N.	64 47 0 W.	70·1	29·961	71·7	65·0	75·1	50·0	29 Mar.	87·9	30 Aug.	652	79	66
ngapore : Fort Canning	110	1 16 0 N.	103 53 0 E.	81·6	29·739	81·9	74·5	88·8	70·0	23 July 27 Dec.	98·0	11 Aug.	·871	76	52
ong Kong ...	18	22 16 20 N	114 8 16 E.	74·3	29·908	74·1	69·6	79·0	42·0	11 Feb.	99·0	7 Sept.	·716	78	44
. Sanitarium	911	22 16 20 N.	114 9 16 E.												

* (Gibraltar) Anemometer broken on 1st September. † (St. Lucia) Rain gauge out of

taken at Foreign Stations during 1897.

Mean Amount of Cloudiness.	Rainfall.			Weather.								Wind.									No. i Obs we
				Number of Days of								Nnmber of Observations under each Point.									
	Total.	Max.	Date.	Rain.	Snow.	Hail.	Thunder-Storms.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	NW.	Calm.	
3·6	27·63	4 90	15 Nov.	55		1	4	3	146	45	3		10	305	3	2	103	167	108	30*	
4·9	13·26	1·41	4 Oct.	91		1	13		70	55	1	34	108	38	88	17	55	77	218	95	
5·5	36·79	1·92	8 Oct.	157	18	4	34	9	74	109		104	265	52	32	72	122	5	13	65	
4·3	34·80	1·74	20 Jan. 19 Mar.	122		2	22		97	73	1	2	6	19	8	2	17	6	5	665	
2·3	164·31	7·39	15 Aug.	157			108		38			28	14	141	13	29	27	277	38	163	
5·3	52·84	2·65	5 Oct.	248			2		13	21			427	106	128	3			1	65	
4·6	46·27	7·20	16 Oct.	91			6		8	19		12	103	4	385	22	116	21	54	13	
5·3	91·81	8·82	16 Oct.	168			14	2	10	24		34	46	28	127	4	2	2	38	449	
4·6	†	†		272			7	4	2	60		8	445	164	72		3		1	37	
6·2	59·40	2·70	25 Oct.	181			17		17	97		75	73	47	74	148	148	34	66	65	
6·8	‡	‡		175			50			170		15	56	1	7	49	158	129	87	228	
6·0	112·61	9·50	8 May	153			18		37	124		9	82	199	51	34	111	13	58	173	

14th to 19th January.

‡ (Fort Canning) Rain gauge stolen on 24th September

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APPENDIX No. XVI.

THE PARKES MEMORIAL PRIZE.

Surgeon-General J. **Jameson**, M.D., LL.D., C.B., Q.H.S., Director-General,
President of Committee.

Colonel J. **Lane-Notter**, M.A., M.D., *Treasurer.*

Captain W. H. **Horrocks**, M.B., B.Sc., *Secretary.*

Prize Essay Medallists.

1883. Surgeon R. J. **Polden**, Indian Medical Service.
1886. Surgeon A. **Duncan**, M.D., Indian Medical Service.
1889. Surgeon R. H. **Firth**, F.R.C.S. Eng., Medical Staff.
1892. Surgeon-Captain R. H. **Frith**, F.R.C.S. Eng., Army Medical Staff.
1895. Surgeon-Major R. **Ross**, Indian Medical Service.
1898. Surgeon-Captain F. Smith, Army Medical Staff.

The following is the subject for the next prize :—

"VENEREAL DISEASES IN THE BRITISH AND INDIAN ARMIES—THEIR PREVALENCE AND PREVENTION."

The Prize is Seventy-five Guineas in Money and a Bronze Medal, and is Awarded Triennially.

The Competition is open to all Medical Officers of the Army, Navy, and Indian Services of Executive Rank on full pay, with the exception of the Assistant Professors of the Army Medical School during their term of office, Essays to be sent to the Secretary of the "Parkes Memorial Fund," Royal Victoria Hospital, Netley, on or before the 31st day of December, 1900. Each essay to have a motto, and to be accompanied with a sealed envelope bearing the same motto and containing the name of the competitor.

APPENDIX No. XVII.

THE ALEXANDER MEMORIAL FUND.

Trustees.

Surgeon-General J. Jameson M.D., LL.D., C.B., Q.H.S., Director-General.
Surgeon-Major-General J. B. C. Reade, C.B., Q.H.S.
Lieut.-Colonel W. G. Don, M.D.

Committee.

Surgeon-General J. Jameson, M.D., LL.D., C.B., Q.H.S., Director-General, *President.*
Surgeon-Major-General J. B. C. Reade, C.B., Q.H.S.
Lieut.-Colonel W. G. Don, M.D.
Colonel W. F. Stevenson, M.B.
Lieutenant-Colonel A. F. S. Clarke, M.D.
Brigade-Surgeon-Lieutenant-Colonel W. Johnston, M.D.
Major W. G. A. Bedford, M.B., *Honorary Secretary.*

Prize Essay Gold Medallists.

1870.	Assistant Surgeon A. B. R. Myers, Coldstream Guards.
1873.	Surgeon F. H. Welch, F.R.C.S. Eng., Medical Department.
1876.	Surgeon-Major J. H. Porter, Medical Department.
1879.	Surgeon John Martin, Medical Department.
1882.	Surgeon-Major F. H. Welch, F.R.C.S. Eng., Medical Department
1885.	Surgeon John Martin, Medical Staff.
1888.	Surgeon R. H. Firth, F.R.C.S. Eng., Medical Staff.
1891.	Surgeon R. H. Firth, F.R.C.S. Eng., Medical Staff.
1894.	Surgeon-Captain C. Birt, Army Medical Staff.
1897.	Surgeon-Major C. Birt, Army Medical Staff.

At a meeting of the Committee held at 18, Victoria Street, S.W., on 31st March, 1897, the prize of 50*l.* and Gold Medal of the value of 10*l.* was awarded to Surgeon-Major C. Birt, Army Medical Staff, for the best essay on " Micro-organisms as Factors in the Production of Phthisis ; the Influence "of Military Service upon the Disease, and Suggestions for its Prevention in "the Army."

The essays of the unsuccessful competitors will be returned on application to the Honorary Secretary before 31st December, 1898. Those of the unsuccessful competitors on the former occasion have, in accordance with the rules, been destroyed.

The subject for the next competition is " Injuries to joints and long bones "caused by modern small-arm projectiles ; their nature, diagnosis, and treat-"ment ; with special reference to the appliances required and available on "field service."

Essays must reach the President of the Committee on or before 31st December, 1899.

Essays are to be legibly written, superscribed with a brief motto, and accompanied by a sealed envelope similarly superscribed, containing the name and address of the author.

No essay shall exceed in length fifty pages of ordinary printed octavo, which may be estimated as amounting to 20,000 words. This limit is exclusive of tables which may be added in the form of appendices.

The competition is limited to executive officers of the Royal Army Medical Corps on full pay ; but Professors and Assistant Professors at Netley are not allowed to compete while so employed.

By order of the Committee,
W. G. A. Bedford, Major, R.A.M.C., *Hon. Sec,*

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